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THE NAVIGATION

OF THE

CARIBBEAN SEA AND GULF OF MEXICO.

Vol. II.

THE COAST OF THE MAINLAND,

FROM CAPE ORANGE (LAT. 4° 21′ N., LONG. 51° 28′ W.) TO THE RIO GRANDE DEL NORTE (LAT. 25° 57′ N., LONG. 97° 08′ W.), WITH THE ADJACENT ISLANDS, CAYS, AND BANKS.

COMPILED BY
William Wilberforce
LIEUT. W. W. GILLPATRICK, U. S. N.

WASHINGTON:
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The following works have also been consulted and drawn from: Reports of U. S. Naval explorations and surveys in Central America and Mexico; *Mer des Antilles et Golfe du Mexique*, Paris 1876; and *Guayne Française et Fleuve des Amazones*, Paris, 1877.

J. R. BARTLETT,
Hydrographer.

U. S. HYDROGRAPHIC OFFICE,
Washington, D. C., January, 1885.

NOTE

The bearings and courses are in all cases *true*, and, in case of lights, from seaward.

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CHAPTER I.

FRENCH GUIANA.—CAPE ORANGE TO MARONI RIVER.

Cape Orange.—The land about cape Orange is very low, but as this promontory forms the eastern side of the entrance of Oyapok river, it is easily discernible from the eastward; when seen from this direction the hills on the west side of the river will be visible behind it. The trees on the extremity of the cape are much higher than those in the vicinity, and are visible from a distance of 12 miles.

A mud bank extends about 18 miles eastward of the cape, at which distance there is only a depth of 3 fathoms; but to the northward of the cape, the great strength of the current from the eastward, and the stream of the Oyapok from the southward, sweeps away the mud from the shore, and at 6 or 7 miles from the coast in that direction there are 5 fathoms, the bank being steep-to. In rounding cape Orange, a vessel should not come within the depth of 5 fathoms.

*** Couripi river.**—The mouth of this river, 1¼ miles broad, lies about 5 miles southward of cape Orange; the general direction of the stream is SSE., and at about 27 miles inland it is joined by the * Ouassa river.

The shores on both sides of Couripi river are intersected by creeks and covered with mangroves, being submerged at high water for a distance of 6 miles; within the entrance the depths in mid-channel are 8 feet over soft mud; above this point the depths decrease to 3 feet at low water.

At 15 miles within the entrance, the river is considerably narrowed, and during the dry season this is the limit of navigation; above this point (known as Manama) the river deepens, and at its junction with the Ouassa, is 5 fathoms deep.

In the Ouassa, the downward current attains a velocity of 3 miles an hour.

Guiana.—The country comprehended under the general name of Guiana is subdivided into French, Dutch, and British Guiana. Its coast line, extending from Oyapok river to the river Orinoco, is generally low; for the numerous rivers bring down vast quantities of alluvial matter, which, accumulating on the shores, forms a border of low ground. The mud between high and low water marks is commonly covered with mangroves; at low water it appears like an inaccessible bank; but at high water it is inundated.

* These names are by some authorities interchanged.

The only ports on this coast are the mouths of the rivers, which for the most part require knowledge and practical experience to cross the bars and shoals that in general encumber them; but as in this region no violent tempests ever occur, and there is not the smallest risk in anchoring in any convenient place, the necessity of forcing an entrance never can happen, as there will always be sufficient time to wait for a pilot, or to make the necessary examination by boats to conduct the vessel in safety.

Winds, &c.—The year on this coast may be considered as divided into two seasons, the comparatively cool one extending from November to May, when the NE. trade reaches the shore with some force; and the very hot season, lasting from June to November, when SE. and variable winds with calms prevail.

The rains follow no exact law, but are very prevalent always; the greater portion, however, falls in the early part of the year when the NE. trade is blowing.

The trade-wind increases in strength and veers to ENE. in the month of November or December, extending progressively along the coast of Guiana and Brazil, and occasionally reaching as far as cape St. Roque. In the beginning of December these winds are generally quite steady at Cayenne, and in January and February attain their greatest force.

In March these winds become weaker and are more northerly in direction. At the end of April and during the month of May the change of season begins to take place; the variable winds extend and approach near the coast, calms and squalls are frequent, and sometimes it blows freshly from the SE.

At about the beginning or middle of April the ESE. winds reach the coast; they first approach cape St. Roque, then extend to the northward, and soon reach along the coast to the mouth of the river Amazon. As soon as these winds have acquired sufficient strength they overcome those from the ENE., which in May and June are to be found when northward of the Amazon, and the latter inclining more to east and ESE. become general along the whole coast of Guiana.

In June the variable winds which, on the meridian of 40° W., extend from the equator as far as lat. 6½° N., generally reach the coast of Guiana; squalls are still frequent, and ENE. winds are accompanied by rain. With a continuance of ESE. winds fine weather sets in, and the rain is carried to the West Indies.

In July, squalls and calms are less frequent, the direction of the wind is more from ESE. than ENE., and the weather is more dry.

In August, September, and October, the winds on the coast of Guiana and Brazil are from ESE., and have acquired their full force; they blow almost uninterruptedly, and to the northward of cape St. Roque fine weather prevails. It has, however, happened that in some years the seasons have been entirely reversed.

The NE. trades blow nearly directly on the coasts of Guiana and the north part of Brazil, and preserve their whole strength during the night. At the end of March they begin to incline; at sunrise blowing between east and ENE., and sometimes in the afternoon and a part of the night from NE.

Near the coast the wind generally decreases in force during the night; in the morning the earlier it commences the stronger will be the trade that day.

Land winds from SW. to NW. blow at intervals during all seasons close to the coast; they are less frequent in the beginning than towards the end of the year, and generally last but a short time.

There are but few squalls experienced on the coast between Trinidad and cape St. Roque during strong ENE. winds. In the months of April, May, and June, when the change of season takes place, and also when ENE. winds are followed by those from ESE. calms, squalls, and storms are frequent. The change of winds from ESE. to ENE., which takes place in November, is effected more suddenly; the atmosphere is more tranquil, and the squalls, calms, and storms are less frequent.

Currents.—On the coast of Guiana the great general current from the eastward reaches within about 30 miles of the coast, or into 8 fathoms water, inside which boundary the tidal streams are perceptible, making towards the shore during flood, and to the northeast during the ebb.

Vessels sailing from ports in Europe to this part of South America generally find the current running westward; some, nevertheless, on approaching the coast have experienced otherwise. From the month of July to October, between the equatorial current and the NE. trade drift, a return stream to the eastward is often experienced, between 5° to 9° N. latitude, and from 30° to 50° W. longitude.

This easterly set has been variously accounted for; it is probably formed by detached portions of the adjacent streams creating a return current. It seems clearly proved that it cannot be attributed to the outflow from the river Amazon and other large rivers of that coast, as these lose their influence on the western edge of the equatorial current.

French Guiana.—The smallest and most eastern of the three colonies is about 250 miles in length, north and south, 100 to 150 miles in breadth, and has an area of 27,560 square miles. Its coast line extends from Oyapok river to the Maroni, a seaboard of about 170 miles in length, and the low alluvial tract along the coast is of great fertility. The mountain chains are wholly of granite, and extend east and west, but do not attain a great elevation.

The trade of French Guiana is chiefly with France and its colonies. Besides the staples of British and Dutch Guiana, its productions comprise pepper, cloves, cinnamon, and nutmegs.

Oyapok river.—From cape Orange the land trends sharply to the southward to the entrance of Oyapok river, the western shore of which

trends NNW., thus forming a large funnel-shaped bight 12 miles wide at the outer extreme, and difficult and dangerous to navigate. The western shore of the river behind the low, overflowed land in the foreground, rises into many hills and mountains which appear when seen from a distance like islands; these are the eastern elevations of the chain occupying the interior between Oyapok river and Cayenne.

Mt. d'Argent, the most prominent of these hills, is situated close to the northwest entrance point of the Oyapok, and in clear weather the grove of trees on its summit may be seen from a distance of 20 miles seaward; it may, however, be mistaken for Mt. Carimaré, which is of the same form but situated farther to the westward. Between these two mountains there is also a hill of similar shape, but much smaller and less elevated, known as False Mt. d'Argent, and behind it again rise several other peaks, the most remarkable of which are the Trois Ermites. Near the head of the estuary of the Oyapok, on the point of land which separates the Ouanares from the Oyapok, stands Mt. Lucas, a small but moderately elevated hill.

Anchorage.—Temporary anchorage can be obtained near a rock marked by a beacon under Mt. d'Argent, but it is not recommended. Mt. d'Argent bearing from S. by W. to SSW. leads from seaward to this anchorage.

Directions for Oyapok river.—The channel between Mt. d'Argent and Mt. Lucas has not been thoroughly examined, and vessels are obliged to follow a narrow and shoal channel on the western side of the estuary lying in a direct line between those hills, and in which there is a depth of 7 feet at low water.

Above Mt. Lucas the channel is divided by numerous islets, the principal of which are iles Biche, Luminabo, Caroline, and Perroquets.

Small vessels ascend Oyapok river as far as the settlement of St. George, lying 30 miles above Mt. d'Argent. The Oyapok takes its rise far in the interior, and, being joined by several lesser streams, conveys a large and rapid body of water to the sea, so that vessels should not enter before the commencement of the flood stream.

Tides.—In the vicinity of cape Orange it is high water, full and change, at 6h. 0m., and springs rise from 12 to 15 feet; the flood runs WNW., the ebb NE., about 3 knots an hour. In the offing the general current takes a NNW. course and runs about 2 knots an hour.

At St. George anchorage it is high water 3 hours later than at Mt. d'Argent; springs rise from 5 to 9 feet.

During the rainy season the current runs continuously southward.

The Coast from the base of Mt. d'Argent sweeps round to the northwest, and the low trees upon it can only be seen at a short distance. A little westward of the meridian of Mt. Carimaré, and at about 20 miles from Mt. d'Argent, is Béhague point, the eastern entrance point of the

river Aprouague. This point, which is covered with high trees, is prominent when seen from the eastward, appearing detached from the adjacent low shore. A bank of soft mud, skirting the shore for a considerable distance, stretches from Béhague point to the northward, and appears to increase its dimensions every year.

Aprouague river is said to be the deepest in Guiana, and the easiest to navigate. Vessels of moderate draught can proceed as far up as the settlement of Guisanbourg, about 10 miles from the mouth. The entrance lies NW. by W. ½ W. about 30 miles from cape Orange, and is easily distinguished by Béhague point, also by the wide entrance of the river itself, within which (at about 6 miles from Béhague point) are two low islands, with a sand bank extending from them in a northerly direction. The right bank lies nearly north and south, whilst the opposite side diverges to the NNW. and NW. without forming a distinct point, consequently all the mud carried out of the river is deposited to the westward, forming an extensive shallow flat, only passable for very small vessels. This river winds inland very far, and is reported to join the Maroni.

Directions.—Vessels should keep in a depth of 2 fathoms at low water until the two islands at the entrance of Aprouague river bear south. Béhague point should be passed close to, and the right bank of the river kept near, as far as Guisanbourg; above this point to Torépé falls (the limit of navigation for small vessels) the river is obstructed by shoals and sand banks.

Connétable islets.—Are two small rocky, barren islets, the eastern of which lies N. by W. distant 15 miles from Béhague point. This islet being the larger is known as the Grand Connétable, and is 164 feet high, of a rounded form, with a flattened summit that may be seen in clear weather from a distance of 25 miles; it is bold and steep-to. The western islet, known as the Petit Connétable, lying WSW. ½ W. distant 1¾ miles from the larger islet, is quite flat, and at high water springs is not more than 3 or 4 feet above the sea; northward and southward of this islet breakers extend about 75 yards. In the channel between Les Connétables the depths are from 5½ to 7 fathoms, but in consequence of the strength of the current a sailing vessel should not take this passage without a fair and commanding breeze. Between the islets and the mud bank which skirts the shore, the soundings gradually and slowly increase in depth from the shore; but outside the islet they deepen abruptly from 8½ to 19 fathoms.

Les Battures.—This dangerous shoal having 11 feet over it, and on which the sea breaks heavily in stormy weather, lies N. by W. distant 5½ miles from the Grand Connétable, with depths of 9 to 12 fathoms between, over soft mud. In calm weather the position of this shoal is only indicated by ripplings.

Cospatrick shoal.—This danger, which has 2¼ fathoms over it, lies N. by W. from Les Battures, distant 1⅛ miles.

Clearing mark.—The southern part of the table land of Mahury, in line with the summit of La Mère islet, leads north of Cospatrick shoal.

Directions.—Sailing vessels should not take the passage between Les Battures shoal and Connétables islets without a commanding breeze; Mt. Bourda, open a little southward of Le Père islet, leads through this channel.

Current breakers.—During the summer the current runs strongly to the north-westward in this vicinity, but in the winter it is overcome to a considerable distance from the land by the tidal streams; especially on the ebb at springs, which being augmented by the large outpour from Aprouague river, runs to the N. and NNW. with great force, causing, at 3 or 4 miles outside the Connétables, heavy breakers, which generally subside at slack water, if the outer current be feeble. The line of ripple or broken water has the appearance of shoal ground, especially as it runs along the edge of muddy water.

Tides.—Between the Petit Connétable and the main land, it is high water, full and change, at 5h. 0m.; springs rise 8½ feet, and neaps from 4 to 5 feet.

The Coast, from Aprouague to Mahury river, a distance of 27 miles, trends to the north-westward, and is only visible from a distance of 7 or 8 miles; it is backed, however, by a uniform ridge lying parallel to the shore and not far inland, named the Kaw mountain, which may be seen from a great distance and is a good guide to vessels passing outside the Connétables.

Kaw river.—This stream reaches the sea at about 18 miles WNW. of Béhague point, but the entrance is narrow, shoal, and difficult to recognize among the mangrove trees.

Mahury river.—The mouth of this river is situated immediately east of Cayenne island, and as it lies directly under Mahury table land (607 feet high) one of the most elevated parts of the island, the entrance is easily made out. The eastern side of the river is very low, and the silt, depositing itself on this side, forms an extensive shallow flat, which sometimes extends nearly to the Remire islands, leaving the deepest part of the channel towards the Cayenne shore. Although this river has less depth at its entrance (8 feet at low water in 1877), and is more difficult to navigate than the Cayenne, it has more water within the bar, which enables a vessel drawing 12 feet to lie afloat at all times, an advantage which the Cayenne river does not possess.

Remire islands are five small wooded islets lying on a NW. and SE. bearing, at 2½ to 4½ miles from the northeast side of the island of Cay-

enne, and about 13 miles westward of the Connétables. Le Malingre, Le Père, and La Mère, are of considerable elevation, and the two latter may be seen soon after making the high lands of Cayenne, and from off the Connétables. The other two, known as the Mamelles, about 80 feet high, are very small and lie close together, at about ½ a mile eastward of La Mère islet. The tidal streams set between these three latter islets with such extreme velocity that they are dangerous to approach in light winds.

La Mère islet is 377 feet high and surmounted by a semaphore.

Le Père islet, 341 feet high, lies NNW. distant 2 miles from La Mère it is a little smaller than La Mère, and a rocky ledge extends 200 yards from its southwest extreme; a similar shoal ledge extends ¼ of a mile from the northwest extreme.

Malingre islet, 180 feet high, and surmounted by a single tree, which appears conspicuous when bearing SE., lies NW. by W. 3¼ miles from Le Père, and is smaller than that islet.

A rocky ledge extends about 400 yards under water in a southerly direction from Malingre islet.

Enfant Perdu.—This small flat rock lies N. ¾ W. 6½ miles from the fort at Cayenne. It is elevated only a few feet above the sea, and from its base a flat rocky ledge, always breaking, extends 200 yards. Between the rock and the main the ground is soft mud, and the soundings gradually increase in depth from the shore. The banks of soft mud which formerly surrounded this island have disappeared and there is no longer an anchorage near it.

Light.—From a framework on piles on Enfant Perdu, a *fixed white* light is shown, elevated 61 feet. This light should be visible in clear weather from a distance of 7 miles.

St. François rock.—At 2½ miles WNW. ¾ W. from Malingre islet, lies a dangerous sunken rock named St. François, and to avoid it when approaching Cayenne river from the eastward, care should be taken to keep Le Père islet open eastward of Malingre islet, until the northwest extreme of Cayenne island bears southward of SW.

Machoiran Blanc is a small rock lying SSW. ¾ W. distant 1½ miles from Malingre islet, or about midway between it and the land. This rock uncovers at low water and is marked by a beacon.

A small head which uncovers at low water, lies N. by W. from Machoiran Blanc distant ⅓ of a mile. Vessels drawing 12 feet may pass between it and Malingre islet, but this requires great caution, and the channel is only navigated by coasters.

Island and river of Cayenne.—The island of Cayenne is bounded on the east by Mahury river, on the west by the Cayenne, and on the

south by a natural canal which unites these two streams; being mountainous, it presents totally different features from any other part of the coast of Guiana. The northeast shore, which is fringed with off-lying rocks, is formed of sandy bays separated by bold rocky heights, which slope towards the south and west; the northwest extreme terminates at a low point, on which is situated the town of Cayenne, at the eastern side of the entrance of the river.

Mount Bourda, 482 feet high, and surmounted by a semaphore, is situated close to the shore on the northeast side of the island.

A cutting has been made in the summit of this hill in an east and west direction, which can be seen from Grand Connétable islet, and forms a good mark for vessels approaching from the eastward.

Off the north extreme of the island, at three-quarters of a mile distant, is a cluster of rocks known as Tas de Roches, and within them are situated the Dupont islets; at about one mile west of these latter are situated English Rocks.

Four rocks known as the Major, Aimable, Maillard, and Cheval Blanc rocks are situated on the eastern side of the entrance to Cayenne river, at an average distance of about a third of a mile from the shore.

Major rock is uncovered and marked by a beacon; Aimable rock sometimes covers and is marked by a black buoy; the white and green lights at fort Cépérou in line bearing SE. by S. lead over it. The Maillard has 9 feet water on it; the Cheval Blanc is usually above water, but sometimes it covers; it is marked by a beacon. The western side of the entrance to the river is bounded by a sand bank extending 1½ miles in a northerly direction from point Macouria, leaving the entrance about half a mile wide.

Within the point on which the town is built, the channel deepens, and vessels moor under shelter of a mole which extends in an east and west direction, and alongside which they can lie at high water.

The bank extending from Cayenne river entrance is known as Les Sommes.

The deepest water over the bar is generally found in a northerly direction from the river's mouth; but this varies continually; therefore pilots are absolutely necessary.

Lights.—From fort Cépérou, Cayenne, is exhibited a *fixed white* light, elevated 130 feet above the sea, which should be visible in clear weather from a distance of 17 miles.

A *fixed green* light is shown from the NW. angle of the infantry barracks, at 69 feet above high water, which should be visible in clear weather from a distance of 4 miles.

This light bears NW. by N. from fort Cépérou light, and is obscured westward of the bearing SW. ¼ S.

These lights in line lead over Aimable rock, which is avoided by passing W. of this line.

Pilots.—The pilots for Cayenne river reside on Mère islet, and on the summit is their flagstaff.

Town.—The town of Cayenne, containing in 1877 a population of about 5,000, is built on the northwest extreme of Cayenne islands; it is the capital of French Guiana and contains several handsome buildings.

Supplies.—Vessels of moderate size can obtain all ordinary supplies at Cayenne, and also facilities for effecting repairs.

Directions for Cayenne.—The rivers of Guiana undergo such frequent changes that it is difficult to give directions that can be depended upon at all periods. The banks of sand and mud are sometimes so extensive as to close their mouths altogether; and although the entrance to the Cayenne may be an exception, it should never be navigated without a pilot.

At all times the land should be made well to the southward of the point of destination, to prevent being carried too far to leeward by the northwest current, which runs at the rate of 2 to 3 knots an hour.

After passing cape Orange, should it not be possible to sight Grand Connétable islet before dark, it will be better to anchor, or stand off and on under commanding sail, keeping outside the depth of 10 fathoms.

Vessels drawing less than 16 feet of water can pass inside the Connétable islets, and run along the land in 4½ fathoms as far as Remire islands; but those of larger draught should pass outside all, taking great care to avoid Cospatrick and Les Battures shoals.

Having passed Malingre islet, great attention must be paid to the lead, and care is necessary to keep Père islet open eastward of Malingre, until the lighthouse on fort Cépérou bears southward of SW., to avoid St. François rock. Until a pilot is obtained it will be better to remain under commanding sail, making short boards, guided by the lead, not standing out into a greater depth than 5 fathoms to avoid the outer current, nor standing in, within the line of Père islet on with Malingre, to avoid St. François rock.

If obliged to enter the river before receiving a pilot, bring the entrance to bear from S. to SSW., and steer directly for it, as the channel generally lies on these lines of bearing. The changes, however, are so great, that to attempt to cross the banks at the entrance without assistance will incur great risk; and at all events it must not be done before half-flood.

Anchorage.—Should it be found more convenient to anchor outside the bar, great care must be taken to see that the bottom is of soft mud, which is generally pointed out by the smoothness of the water. On these spots, between April and November, a vessel may venture into little more than her draught, as no harm will come should she touch the ground. In the other months and with spring tides, anchorage here, however, is attended with considerable risk, particularly if the an-

chor be dropped on hard mud. At this period the pororoca or rollers prevail with NE. winds, rising so rapidly, and breaking so violently, that a small vessel is exposed to imminent danger.

With spring tides the sea will sometimes top, without any warning whatever, in 8 fathoms of water. At no time should a vessel bring up to the westward of the entrance. In the fine season a vessel of very light draught may anchor between Père and Malingre islets, or between the latter and Cayenne, but it must be on soft bottom. A convenient berth lies eastward of the Enfant Perdu, with the fort at Cayenne bearing SSW. The nearest permanent anchorage, for large ships, is the one at Salut islands.

Tides.—It is high water, full and change, at the entrance of Cayenne river at 4h. 16m. At the equinoxes the rise is 10 feet, at ordinary springs 7 feet, and at neaps from 4 to 5 feet. On the bar at high-water springs there is sometimes a depth of 17 feet. Near the coast the flood stream sets to NW. with a velocity of 2 to 4 knots an hour, varying with the seasons.

The ebb stream sets to NE. with a velocity of one knot an hour. Between Cayenne and Enfant Perdu the flood stream sets from SSW. to WNW., and the ebb from N. by E. to E. by N.; the ebb is the stronger stream, varying in velocity from 1½ knots an hour at neaps to 2½ knots at springs.

Upper river.—At 9 miles within the entrance, Cayenne river divides into two branches, known as Tonnégrande and Cascades rivers.

Tonnégrande river is navigable as far as a town situated two miles within the entrance.

Cascades river is navigable for about 10 miles.

Coast.—The coast from Cayenne river to the Kourou river trends NW. for a distance of 21 miles, and is known as the coast of Macouria. From Macouria point to the river of that name, 11 miles distant, the shore is low and sandy; but about midway and not far inland is mont Macouria, 360 feet high, which at a certain distance appears like an island. Macouria river is small, and the mouth so narrow that it is not easily found until close upon it. Between the Macouria and Kourou rivers the shore is bounded by mangroves, somewhat more elevated than elsewhere.

Kourou river.—Close to the shore on the east side of Kourou river is mont Guatemala; at a short distance farther inland to the southwestward lies mont Condamine, 560 feet high; and on the west side is situated mont Pariacabo. These are all remarkable objects when seen from a long distance, and afford good guides for the entrance of the river. The mouth of Kourou river lies between low points, the eastern of which projects a little distance beyond the other. It is narrow, but deep enough or vessels of moderate draught, and has the advantage of good anchor-

age in the immediate vicinity for large vessels. In 1879 the depth over the bar was 13 feet.

The western shore of Kourou river is rocky, and does not change; the eastern side is formed by a mangrove swamp, which frequently alters in form.

Garadier rocks.—These rocks lie ENE. ½ E. distant 4½ miles from the entrance of Kourou river, and 2½ miles from the shore; they generally uncover 3 feet at low-water springs, but are seldom visible at ordinary tides. Lying immediately in the route of small vessels passing to and fro from Cayenne, they are, of course, very dangerous.

The position of these rocks is generally indicated by breakers.

About midway between Garadier rocks and the shore is situated a group of three rocks above water known as the Bonnet rocks.

Kourou rocks.—These two dangerous rocks (marked by beacons) lie between Garadier rocks and the entrance of Kourou river, at about half a mile off shore. The eastern of these (La Folle) uncovers at low water, the western (Vitalo rock) has one foot over it; these rocks are directly in the way of vessels visiting the Kourou.

Charlotte point.—At 3 miles NW. from the entrance to Kourou river there is a well-defined point with some rocks at its base known as Charlotte point; a stream of water falls into the sea near this point.

A chain of rocks extends in a northeasterly direction from Charlotte point for nearly a mile; the outer part of these, known as Roches Plattes, uncovers.

Salut isles.—This group of three small rocky islets, known as Joseph, Royale, and Diable islets, occupying a space of about a mile in each direction, lies NE. distant 7 miles from Charlotte point, and NW. by N. distant 25 miles from Cayenne. Joseph, the southern islet, is 121 feet high; Royale, the central islet, is 197 feet high; and Diable island is 95 feet above the sea. They are inhabited, and upon them are extensive government buildings.

Light.—A lighthouse stands on the summit of the hospital on Royale islet, from which is exhibited, at an elevation of 197 feet above sea, a *fixed white* light, which in clear weather should be visible from a distance of 13 miles.

Anchorages.—Anchorage in 3¾ fathoms, muddy bottom, will be found at about ⅓ of a mile from the west side of the northernmost islet, sheltered from the prevailing east winds; and in the bight formed between Joseph and Royale islets there is still better shelter, especially for vessels of light draught, in 3 fathoms. These are the best and indeed the only safe anchorages on this coast, outside the rivers.

Vessels passing south of Joseph island should carefully avoid the spit extending 200 yards south from it.

Tides.—It is high water, full and change, at Salut isles at 4h. 26m.; springs rise from 6 to 10 feet.

Supplies.—Small supplies of fresh water can be obtained at Diable and Joseph islands, and coal is stored on Royale island.

Amazon shoals.—In a NW. direction from the center of Diable island, and between the distances of $\frac{7}{10}$ of a mile and $1\frac{1}{2}$ miles from that island, are situated numerous shoal heads, having over them depths varying from $1\frac{1}{2}$ to $2\frac{3}{4}$ fathoms, hard sand.

The nearest of these to Salut islands has over it $1\frac{3}{4}$ fathoms, and lies N. by W. $\frac{1}{4}$ W. from Royale island lighthouse, distant nearly one mile.

Coast.—The coast from Charlotte point to the Counamana river, a distance of 30 miles, takes a general NW. by W. direction, the shore being low and sandy. Here and there will be seen a few habitations and small clumps of trees, and the whole line of coast is closely fringed with detached rocks, which become more numerous in the vicinity of Verte isle.

On this extent of coast, the eastern entrance point of Sinamari river, is marked by a clump of mangroves, which rises higher than those in the vicinity.

Caution.—The Remire, Connétable, and Salut islands are the only outlying points on the whole of this coast that could endanger a vessel, should she touch them; it is therefore imperative to be cautious against the current when passing. The passage between the Connétable islets should not be attempted without a leading wind; it is much better to pass outside them at a sufficient distance to give a wide berth to the Battures and Cospatrick shoals.

Malmanouri flats.—At about 10 miles W. $\frac{1}{2}$ N. from the Salut isles there is a chain of rocks at 2 miles from the shore, known as the Flats of Malmanouri. It is 2 miles in extent from east to west, and one mile from north to south; the edges are of hard mud, and the breakers over it may be seen from a distance of 2 or 3 miles. The sea is heavier here than on any other part of the coast.

Mt. Diable.—On the bearing SW. from Malmanouri flats, and at about 9 miles inland, there is a very remarkable conical hill named Mt. Diable, which may, in clear weather, be seen from a distance of 20 miles.

Verte isle.—This small islet lies about $1\frac{1}{2}$ miles from the shore; at 17 miles W. by N. from the Salut islands, and N. by E. from Mt. Diable.

It is very low and partially covered with dwarf shrubs, so that it is difficult to make out. There is a channel between Verte isle and the main for small vessels, but it is said to be filling up.

Sinamari river.—From abreast Verte isle to the mouth of the Sinamari, the coast continues its NW. by W. direction for 5 miles, present-

ing no remarkable object whatever, until the eastern side of the river is approached, where the trees form a grove higher than those adjacent. A mud flat extends off 6 miles, which prevents an approach sufficiently near to make out the entrance; but a good guide will be Mt. Corosoni, bearing SW. ½ W.

Corosoni rocks.—To the westward of the Sinamari the shore is low and sandy, and for 5 miles is skirted by a ledge of rocks (known as the Corosoni, or Toulonaise) extending about a mile from the shore, with shallow ground a long distance outside, that will warn a vessel of her approach.

Counamana river.—The entrance to this river, about 12 miles westward of the Sinamari, is difficult to find, and like the latter, is only available for small coasting vessels. Near its mouth there are some huts, and westward of the river there is a remarkable ridge of irregular conical hills, named the Iracoubo mountains, which extend in a WNW. direction about 12 miles, being the last elevated land that will be seen eastward of Maroni river. The easternmost hill of this range bears SW., about 8 miles from the mouth of the Counamana, and may be seen from a distance of 15 miles.

Bourgeois rocks.—From Counamana river the shore trends WNW. for 7 miles to the Iracoubo. About midway between these rivers, and but a short distance from the coast, lies a small ledge of rocks, above water, named Bourgeois, which are the last that will be met with when preceding to the westward.

Caution.—In navigating this part of the coast care should be taken not to come within the depth of 4 fathoms, to avoid the ledges just described, lying between Iracoubo river and Cayenne. These are the only known dangers to be guarded against, and it is to be observed that whenever the shore is bounded by mangroves the bottom in front is muddy, and deeper and bolder than elsewhere.

Iracoubo and Organabo rivers.—The Iracoubo will only admit small vessels, and the entrance is difficult to recognize. From thence to the Organabo the coast trents WNW. for 13 miles, and is formed by a low sandy shore scantily covered here and there with clumps of brush wood. The interior is generally overflowed and forms extensive lagoons. The mouth of the Organabo (marked by a group of green islets) bears N. by W. from the western extreme of the Iracoubo mountains, but it is difficult to find until close to it, and is so narrow and shallow as to be only fit for small coasters.

Mana river.—At about 10 miles westward of the Organabo, high land begins to rise from the interior, which trending towards the north terminates near the entrance of Mana river, situated WNW. 28 miles from the Organabo. The Mana will only admit small coasting vessels

at high water, the mouth being obstructed by a mud flat, extending NW. 6 miles from the entrance.

Acarouani river.—This deep river enters the Mana river from the westward, 6½ miles from its mouth, and ½ mile above the town of Mana. The Acarouani is navigable for small vessels for a distance of 8 miles.

Maroni river, which forms the western boundary of French Guiana, enters the sea at about 8 miles westward of the Mana; the entrance between Les Hattes (Française point) and Kaimar head or Galibi point, is about 2½ miles wide, and open to the NNE. On Kaimar head there is a Dutch post and light-house. Les Hattes, the east entrance point, is surrounded by a clump of trees, and has a light-house on it. From the west entrance point the shore takes a northwesterly direction for about 5 miles, and then at point Grosbois resumes its westerly course; this part of the coast is more elevated, and on point Grosbois are two conspicuous hummocks, which are guides to the entrance of the river.

From Française point a mud flat (known as French banks) extends northward 4 miles, and from Kaimar head a sand-bank extends to the northwest about 5 miles, breaking at half tide. Between the two banks there is a channel about one mile broad of 13 feet water, but it is only navigable for small vessels; large canoes ascend the river as far as Armina, which is a little below the first rapids.

The two bluff points at the entrance may be seen from a distance of 13 or 14 miles when in a depth of about 5 fathoms. It is remarkable that in the vicinity of this river the bottom is composed of red sand, which is a good guide when approaching at night, the bottom off other parts of the coast for a distance of 30 miles being of mud.

Lights.—From a white pyramid shaped structure on Les Hattes point a *fixed white* light is shown, elevated 75 feet, and visible in clear weather from a distance of 10 miles between the bearings of E. by N. through south to W. by S.

A *fixed white* light is also shown from a white pyramid-shaped structure on Kaimar head. This light is elevated 75 feet, and should be visible in clear weather from a distance of 10 miles, between the bearings S. ¾ E. and W. ¾ S.

Buoyage.—The outer buoy is conical shaped, painted red, and lies in 18 feet water, with Kaimer head light bearing S. 43° W., and Les Hattes light S. 14° W.

The inner buoy is conical shaped, painted red, and lies with Kaimar head light bearing S. 38° W., and Les Hattes light S. 13° E.

A pole beacon, surmounted by a small triangle, has been placed upon the French bank in 10 feet at low water, with Kaimar light bearing S. 51° W. and Les Hattes light S. 7° E. The beacon is inclined at an angle, to prevent it being mistaken for a tree upon the coast.

Directions for Maroni river.—Vessels bound to Maroni river from the eastward, should not shoal the water less than 6 or 7 fathoms, until Kaimar head bears SW. ½ S., when it should be steered for on that bearing, leaving the outer buoy upon the port hand, and the inner buoy upon the starboard hand, and when Panato point bears south, steer for it on that bearing.

Tides.—It is high water, full and change, at the entrance of Maroni river at $5^h.\ 0^m.$; springs rise 9 feet and neaps 6 feet.

The flood stream off the entrance to Maroni river sets first to NW., then west, and finally south.

The ebb stream has a tendency to set towards the Dutch banks.

Soundings.—It would appear that changes frequently take place in the depths off many parts of the coast of Guiana, particularly near the land. In 1817, between Connétable islets and the main, a depth of 8 fathoms was recorded, which in 1826 was reduced to 5 fathoms. In the same period the depth in the channel between the Salut isles and the shore is presumed to have changed from 8 to 4 fathoms. During the same interval, however, farther out between cape Cachipour and the Maroni river, no alteration was observed. These supposed changes are rather in excess of what could fairly be ascribed to deposition from the rivers, and are no doubt partly due to original errors in sounding; but changes of a lesser degree occur periodically off the entrances of the streams of Guiana.

It is to be observed that off the entrances of all the large rivers of Guiana (excepting the Maroni), extending to a considerable distance from the land, the bottom is invariably of mud and shells, which is a good guide, for elsewhere it is of mud alone.

Tides.—The effect of the tidal streams is felt as far as 30 miles from the coast, where they merge into the general current setting to the NW. The ebb stream on leaving the rivers, expands and sets away from the land, whilst the flood converges to the mouths; there is, however, a movement of both streams to the westward, in conjunction with the current.

Mud banks.—The banks which are adjacent to the coast, change their outline frequently, and are sometimes swept away to be re-formed; this occurs principally at the mouths of the rivers. During the freshets of the rainy season, the deposits are carried from the mouths of the rivers, thus deepening their channels.

They extend off shore from 5 to 12 miles, and have over them a depth of less than 4 fathoms; they are formed by the deposition of mud from the streams of the interior, which are highly charged with it.

If these banks remain long in one position they become indurated, and it requires the tidal influences of several years to remove them. When they are in this hardened state, they are frequently discovered

by the sea breaking furiously over them into the mouths of the rivers, as if it were over a coral bottom; whereas over soft mud the water is generally smooth, and if of sufficient depth offers temporary anchorage.

The greatest changes appear to take place between cape Orange and Cayenne, correct records of which have been kept at the latter place for a long period. Off Cayenne the hard mud bank, known as the Sommes, never extends beyond the line of Malingre and Père islets, because outside that the tidal stream is in proximity with the edge of the current, which at this point approaches nearer the coast. The depths vary sometimes, however, between the Sommes and the Enfant Perdu; but the deposit there has not time to harden, and it never accumulates beyond a certain degree.

Trees.—During the rainy season the trees and grasses are torn away from the banks of the rivers, and thrown out upon the shallow mud flats, where they take root with great rapidity, and cause the mud to accumulate round them, so that the features, and even the direction of the coast, are frequently changed to a considerable distance. Northward of the city of Cayenne, in 1826, trees were growing where, in 1820, there was a depth of 15 and 16 feet water; and about 20 or 30 years previous to this they approached within 2 or 3 miles of the Enfant Perdu.

The Prororoca, or Bore, is a tidal phenomenon which occurs between Macapá and cape North, where the mouth of the river Amazon is contracted by islands, but especially opposite the mouth of the Araguary, which enters this river on the north. During the three days nearest the full and new moon, or at the time of spring tides, the sea, instead of taking nearly six hours to rise, attains its greatest height in a few minutes.

As soon as the tide has ceased ebbing, at the distance of 3 to 6 miles, a roaring sound is heard at sea, which denotes the approach of the prororoca or heavy rollers; as it approaches the noise increases, and soon a body of water 12 to 15 feet high is seen; then another, then a third, and sometimes a fourth, which follow each other closely, and occupy almost the whole breadth of the channel. It approaches with great rapidity, breaks, and carries away in its course everything opposed to it.

When these waves have rolled on, the noise wears away, and the stream of the flood continues regularly, but without perceptibly raising the level of the water, which has acquired almost all its height of 42½ feet in the vicinity of cape North in the short space of about ten minutes which has elapsed between the first and last wave. It is the most dangerous during the winter months. In some places tracts of land are carried away by the prororoca, large trees torn up by the roots, and destruction of every kind ensues.

Routes according to seasons.— Vessels bound to the coast of Guiana should endeavor to make the land southward of the port, but should not approach the river Amazon in order to avoid the prororoca. Having made the land, run along it with the lead constantly going, keeping in more than 7 fathoms water, to avoid the shoals bordering the coast; although in these soundings land cannot be seen in some parts, even in clear weather, it can be no inconvenience, for on nearing the point of destination the vessel may be hauled in until the land comes into view.

This may be done when it is desirable to recognize any particular part of the coast; but in such cases great attention must be paid to the lead. If a vessel nears her port at nightfall it will be better to anchor, and also in light winds when within the limits of the tidal streams; for the flood sets in towards the land. A vessel even when in 8 fathoms water will stir up the mud from the bottom, apparently as if her keel were ploughing through it; a fact which might cause anxiety to any one observing it for the first time.

July to November.—On the coast of Guiana the fine season lasts from July to November. The belt of variable winds north of the equator extends on the meridian of 30 W. from lat. 10° N. to 11½° N. in August; a vessel, therefore, necessarily traverses the space of rains and calms in proceeding from ports in Europe to Cayenne. In this season after reaching the NE. trade wind, a vessel should endeavor to pass from 300 to 500 miles westward of the Cape Verde islands, and from thence a course should be shaped to the southward so as to cross the variables as quickly as possible, and gain the SE. trade winds which advance in July as far as lat. 10° N. on the meridian of 30° W. Having met them it will be advisable to run down on the parallel of 3° N., which the variables seldom reach at this period; here the winds are fresh and favorable, the weather continually fine, and the current strong to the westward. Endeavors should be made to keep in 3° N. until soundings have been obtained in 45 or 50 fathoms, when a more northerly course may be pursued, until the depth is reduced to 7 fathoms. The land has nothing whatever remarkable upon it on this parallel, and is not visible from a depth of 7 fathoms; a vessel will therefore have no other means of knowing her exact position than by the soundings and astronomical observations. The distance from the shore will be very doubtful, but all dangers are avoided by not coming within the depth of 6 or 7 fathoms.

December to May.—During this period the weather is generally rainy on the coast of Guiana, and in these months vessels bound for French Guiana may, after passing the Cape Verde islands, reach it by running down in the NE. trade, keeping in all cases somewhat southward of the point of destination, on account of the influence of the NW. current.

When approaching the coast, as the longitude may be in error, timely soundings should be taken to ascertain when on the bank; if keeping in lat. 4° N., the depth of 25 fathoms will be obtained at 45 miles from the land; if in lat. 3° N. the depth will indicate a greater distance from the shore; in either case a course may now be shaped to the NW., taking care not to come into less than 10 fathoms, more particularly when passing the banks off cape Orange.

In whatever position a vessel should find herself, if the NE. winds which predominate at this period are moderate, a WNW. course may be pursued, so as to gradually decrease the depth. Should the wind be strong, extra caution and more frequent soundings are necessary when closing this coast.

In thick weather it will often be advisable to keep in the offing until it clears, and the vessel's position determined.

May and June.—The northern limit of the variable winds during the month of June extends (on the meridian of 40° W.) to lat. 6° N., and they often extend as far as the coast of Guiana; even when they do not, they are never far off. The current at this period is strong; calms prevail; the weather is squally, and if it blows hard it is more often from the SE. than the NE. If the wind will permit, the parallel of 10° N. should be passed on the meridian of 37° or 40° W., and a course shaped so as to reach the parallel of 4° N. before getting within 300 miles of the land; this parallel should then be followed until near the shore, which must be navigated in 6 to 7 fathoms water, as already directed. During these months and the latter part of April the winds are more favorable for navigating to the northward.

Caution.—From December to the end of March it may not be necessary to keep farther to the southward than the latitude of Cayenne; but from April to July it is indispensable to proceed to 4° N., for if calms are met with in traversing the westerly current, which is frequently the case, a vessel will infallibly be drifted to leeward, and find great difficulty in reaching Cayenne. Should this happen, and the wind fail after getting into soundings, even in 30 fathoms, it will be better to bring up with a kedge or stream anchor, and await the breeze.

Route to windward.—Vessels of light draught proceeding to windward from the Antilles, or having been set to leeward of their port in the season of the NE. breezes (December to end of March), will find it easy to work up between the land and the inner edge of the current, which is generally encountered in the depth of 6 fathoms. Those of heavy draught will find it more to their advantage to cross the main stream, and work up in the zone of variable current.

From May to November this will be the best plan for all vessels to adopt, for at this period the SE. winds and inshore currents are at their greatest strength. The inshore passage in these months should only be made by vessels drawing less than 10 feet water.

Current.—The direction of the principal current at some distance from the coast is nearly NW. by W., and its general velocity from 2 to 3 knots an hour, but the position where its strength slackens and the direction changes is extremely uncertain. A counter-current may, however, be met with from July to November between lat. 8° and 10° N. on the meridian of 50° W., where its direction changes to N. and NNE. Farther eastward the zone of this counter-current increases in breadth, the velocity is greater, and its direction more easterly, as far as long. 37° W. From thence it progressively expands, but decreases in strength, merging into the Guinea current in long. 25° W. In the northern part of this eddy the direction of the stream inclines more to the northward, and the contrary on the southern limits. Profiting by these changes, and watching the reckoning closely, the voyage may be made to windward at the rate of 60 miles a day.

When standing along shore, even in the depth of 10 fathoms, it will frequently appear as if the vessel were stirring up the mud at the bottom; and on the soft banks correct soundings are very difficult to obtain.

Discolored water.—After passing to the southward of lat. 10° N. and between the meridians of 46° and 50° W. the water is often seen to change color from a light blue to dark green or dirty drab, with a current setting to the eastward at about one mile an hour. As the vessel proceeds to the SW. on about the parallel of 8° N. the usual light blue tinge will be resumed, and she will then have entered the general westerly stream; this light blue color will continue towards the shore, even within the boundary of deep soundings.

CHAPTER II.

DUTCH GUIANA.—MARONI RIVER TO CORENTYN RIVER.

Dutch Guiana lies between British and French Guiana, being separated from the former on the west by Corentyn river, and from the latter on the east by Maroni river. It presents a sea face about 170 miles in length, without any elevated spot of consequence throughout its whole extent. Its southern limits are but imperfectly known, but the supposed area is about 38,500 square miles.

The trade of this colony is principally with Holland. The chief productions are sugar, rum, molasses, cocoa, and cotton; of recent years gold has also been discovered.

Coast.—The coast from Maroni river to Braam point, a distance of about 80 miles, trends nearly straight WNW. ½ W. for about 60 miles, thence WSW. ¼ W. for 20 miles; it may be navigated without fear, provided attention is paid to the lead.

Wia Wia banks, which fringe the coast between Maroni river and Post Orange, are said to have only 2 or 3 feet water over them; they extend about 6 miles from the shore. Southward of these banks is a creek of the same name, the entrance to which is in long. 54° 8′ W.

Saramina river.—Between Wia Wia creek and Post Orange the entrance of Saramina river will be perceived; the entrance points are seen when bearing SW., and will be lost sight of when bearing S.

Vessels approaching this river at low water must be careful to avoid the bank extending about 6 miles off shore; at this distance the depth will not be more than 3 fathoms water.

Post Orange, or Vredenburg.—The next object seen on proceeding westward is a little village or post, situated on the shore about 38 miles westward of Kaimar head, the western entrance point to the Maroni. It lies almost hidden in the wood, and is known by a small fort, on which the Dutch flag is generally hoisted when a vessel is seen passing; this fort is better seen than the two or three white barracks, situated in the vicinity. Some authorities state that high land may be seen far in the interior, between Maroni and this place.

Branchwacht, or Mot creek.—To the westward of Vredenburg the shore is sandy, and backed by swamps and extensive lagoons. At about 10 miles from it there is another small village at the entrance of a creek

named Branchwacht. It is shown by a small break in the trees that border the shore.

Caution.—When the opening to Branchwacht creek bears S., a vessel running along the coast should haul out to NW., keeping in 3½ or 4 fathoms water to avoid the east side of an extensive mud flat, the north extreme of which lies about ENE. ½ E., distant 24 miles from the light-vessel at the entrance of Surinam river. This shoal commences about 4 miles eastward of Mot creek, and extends from the coast 8 or 10 miles.

Metappica and Warappe creeks.—Westward of Branchwacht creek is situated Metappica creek, which is not visible from seaward. There are here, however, a considerable number of buildings which can be seen when the atmosphere is clear.

Warappe creek lies 3 or 4 miles westward of Metappica creek; at this spot the coast is everywhere cultivated, and many of the trees standing by themselves present the appearance of vessels sailing before the wind.

At about 16 or 18 miles eastward of Surinam light-vessel there are two remarkable palm trees which resemble large flags on poles.

Crab wood.—Where the coast begins to trend to the southwest, on the edge of the wood there is a row of trees without leaves, of a singular brown burnt appearance, which have existed for many years, and is known as the Crab wood. These burnt trees are a good landmark before making Braam point; they lie about 8 miles eastward of it, and are rather extensive. The land at the entrance to Surinam river will not be seen when outside the depth of 4 fathoms.

False Braam point.—Having passed Crab wood, False Braam point will be seen, it being the farthest point of land visible to the westward.

Braam point.—This point, which forms the east side of the entrance to Surinam river, is very low and lies 1½ miles to the southward of False Braam point. A beacon, which formerly stood on this point, no longer exists.

Surinam river.—This river, the principal stream in Dutch Guiana, is navigable for vessels drawing 14 feet, to Paramaribo, the chief town and seat of government (situated on the left bank about 12 miles from the entrance), and for small vessels to a considerable distance farther up. The mouth, which is about 2 miles wide, opens out to the westward, and the channel through it is bounded on the eastern side by a firm mud bank extending NNW. from Braam point, and to the westward by a soft mud bank, which also extends far out to sea; the south shore is not seen until a vessel is within the outer banks. Numerous small rivers and creeks empty into Surinam river. The discolored water from it is seen when at a considerable distance in the offing.

About 3 miles within Braam point, on the eastern shore, is situated

Resolutie plantation, abreast of which, and extending across the river, is the lower bar of Resolutie shallow, with 10½ to 11 feet on it. At 2 miles southeastward of Resolutie plantation, at the entrance to Commewyne river, is the quarantine establishment, off which there is anchorage.

Commewyne river is about 1 mile wide at the mouth, with a depth of 9 feet; a bar of sand extends from fort Amsterdam for a quarter of a mile, but there are depths within at high water of 3 or 4 fathoms; it is not, however, navigable for vessels of heavy draught. The banks are highly cultivated.

At fort Amsterdam, situated on the south entrance point of Commewyne river, Surinam river forms a bend to the S. and SW. to the city of Paramaribo. Above the fort, between the upper and lower bars, the river considerably deepens, and vessels of heavy burden generally drop down here to complete their cargoes. Abreast Voorburg plantation, at three-quarters of a mile south of fort Amsterdam, is a spot known as Tigers hole, which has 6 fathoms water. At Jagtlust plantation, about 4 miles southward of fort Amsterdam, is a signal station, and here the second bar extends across the river, carrying over it only 12 feet water close off Jagtlust estate; the channel then deepens to the anchorage.

Paramaribo.—This town was built in 1652; it has about 1,400 houses; and in 1852 it contained, with its suburbs, 16,338 inhabitants. In front of it there is anchorage in 4 and 5 fathoms water, capable of receiving about 100 vessels. A little below the city, on the left bank, is fort Zeelandia, which protects the shipping, and off it there are depths of 6 and 7 fathoms. There are two piers and several quays at the town.

Light.—At the entrance of Surinam river, a light-vessel is moored in 14 feet, at low-water springs, from which is exhibited a *fixed white* light at an elevation of 25 feet above the sea, which may be seen in clear weather from a distance of 4 miles. The vessel has two masts, is painted *red*, and has on each side in *white letters* the name *Surinam*. A *red ball* is placed on each mast-head. From the vessel Braam point bears SE. by S. distant 4½ miles. The position of this light-vessel is not to be depended upon.

Pilots.—The Netherlands Government has given instructions that, on the arrival of a vessel-of-war of any nationality at the entrance of Surinam river, the captain or mate of the light-vessel shall do duty as pilot, if required.

Buoys.—The entrance to Surinam river is marked by three black buoys. The outermost lies in 9 feet at low water, with the most easterly land visible bearing S. 88° E., and Braam point bearing S. 34° E. The middle buoy lies in 12 feet, with Braam point bearing SE., and the most easterly land visible bearing N. 81° E. The inner buoy lies in 11 feet,

with Braam point bearing S. 63° E., distant 1½ miles. The position of these buoys cannot be depended upon.

Anchorage.—With Braam point bearing about east, there is a pit or hole known as the Pool, having 16 to 17 feet water in it, which affords good anchorage for vessels waiting for wind or tide. In every part of this river the anchor sinks deep into the mud, and if a protracted stay is made, it will be well to weigh the anchor from time to time.

The anchorage abreast of Paramaribo is known as Paramaribo roads; it is not advisable to anchor close to fort Zeelandia as the current runs strongly. Heavy rollers are experienced in December, January, and February.

Provisions are very high.

Water.—Vessels-of-war obtain water from a well in the vicinity of the landing place, and merchant vessels from wells in the town, but sometimes they are obliged to obtain it from the Soden Savannah, as the inhabitants depend upon rain caught in cisterns.

Directions for Surinam river.—Vessels bound to Surinam river from Europe should endeavor to cross the parallel of lat. 5° N. on about the meridian of long. 50° W., unless they have good chronometers, when they may venture to cross that meridian a degree farther to the northward; bearing in mind, however, that, in the rainy season more particularly, astronomical observations are interrupted by long intervals of cloudy weather.

The object should be to obtain soundings, and, if possible, make the land in the neighborhood of Cayenne, where it is so remarkable. If soundings are obtained in 60 fathoms, fine sand and mud, in about lat. 5° 55′ N., it is a certain indication of being to the eastward of that place. Should a vessel have been swept by the current to the northward of lat. 6° N. without sighting the high lands to the eastward of Maroni river, she will find 30 to 45 fathoms soft mud, with fine sand and broken shells, at 60 to 90 miles N. and NE. of that river.

In approaching the shore about Mana point, eastward of the Maroni, great care must be taken not to come within the depth of 10 fathoms, where the ground will be coarse. This will avoid the Maroni shoals which extend to the northward 8 miles from the shore, where the depth is only 2 fathoms, and 20 miles to the northwest, where it is only 3 fathoms. At 30 miles NE. from the Maroni there are 15 fathoms, and here the current generally runs to the NW. at the rate of 2 to 3 knots an hour. To the westward of Maroni river the bottom is soft sand and mud, which is a good guide.

The land should by all means be made about Vredenburg, to insure being to windward of Braam point, for, should it be missed, there will be great difficulty in getting to windward again. This remark applies also to vessels bound to Surinam from the northward, or the Antilles.

Having sighted Vredenburg, a vessel may safely run along shore by the lead, taking care when off Branchwacht to haul out to avoid the bank, lying NW. of it, keeping in not less than 4 fathoms; from Surinam light-vessel steer for the outer buoy, remembering that if the vessel is of more than 12 feet draught she must await the flood tide.

If of heavy draught a vessel should not attempt to pass the buoys without the certainty of being able to gain an anchorage within before dark, for getting aground here is often attended with fatal consequences, although a vessel may sail over the soft flats in little more water than she draws. Should it be necessary to wait for the wind or tide, instead of heaving to, it will be better to anchor outside in 3½ or 4 fathoms, to prevent being swept to leeward by the current.

Having passed within the buoys, which must all be left to the eastward, the chimney of Resolutie plantation should be opened to the southward of the trees on the east side of the river, to avoid the hard spit extending from Braam point. When within the point, a course should be steered for fort Amsterdam, and if necessary to await a pilot, a vessel should bring up anywhere below Resolutie. The mud after passing Braam point is so soft that vessels can go through a depth of 2 or 3 feet of it. On proceeding up the river when passing Resolutie, the depth will decrease to 11 feet at low water on the lower bar. In approaching Commewyne river great care must be taken not to get set into it by the flood, as a vessel cannot return except with the following ebb tide; and, at the same time, not to approach too near the western shore of the Surinam, from which shallow ground extends.

After passing fort Amsterdam the water will deepen; from thence to the upper bar is the deepest part of the river, and the eastern shore must be kept abroad as far as Jagtlust, below which vessels of heavy draught generally unload and load.

From the shore near Jagtlust a course must be steered for the vessels at anchor off the town.

Upper river.—Above Paramaribo the river is clear, the deepest water being in the middle, and decreasing regularly towards the sides.

The first mud bank above the town is just south of Ric à Rac plantation, off Gœde Vrede plantation; it is steep-to, and the channel southward of it has 6 fathoms water. Above Toledo plantation the river is not navigable on account of the numerous sand banks.

Boats can only ascend to Soden Savannah at high water.

Caution.—Bathing is dangerous in Surinam river, from the force of the stream and the attacks of saw-fish. Instances have been known of soldiers, whilst washing their clothes on the banks of the river, losing their legs from the attacks of the saw-fish. Care should also be taken to prevent water serpents getting on board by the cables, as a bite from one of these reptiles may cause death in two or three days. Boats should be kept in the water as little as possible.

Tides.—It is high water, full and change, at the light-vessel off Surinam river at 5h. 0m.; at Braam point at 5h. 30m.; off fort Amsterdam at 6h. 0m., and at Paramaribo at 6h. 0m. Springs rise 9 to 10 feet, neaps 5 to 6 feet. The water falls 1½ or 2 feet before commencement of the ebb stream in mid-channel. In the offing, the flood stream sets to the westward, the ebb to the eastward. The influence of the tides is felt at above 60 miles from the mouth of the river, and the water becomes fresh at about 25 or 30 miles up.

Coast.—From Surinam river, the shore trends W. by N. for about 33 miles to Barbara point, at the common entrance of the Saramacca and Coppename rivers. It is low and sandy, and backed by mangroves and trees, which are remarkably green, and visible from the offing, when on soundings of from 9 to 10 fathoms. At about 15 miles from Braam point there is a remarkable break in the woods, known as the Gap; and at 10 miles farther to the westward a conspicuous clump of trees, named the Bear's rump, forms a good mark.

Rivers Saramacca and Coppename.—The entrance to these rivers is about 7 miles wide, but it is so obstructed by shoals as to be only navigable for vessels drawing about 12 feet. The Saramacca at its entrance runs nearly east and west, and for 4 miles it carries from 6 to 9 feet at low water, but farther up the river deepens to 6½ fathoms.

The channel of Coppename river is bounded on the westward by a mud bank, and on the eastward by Coppename shoal, which extends from the east point of entrance as far as the entrance to the Saramacca. The least water at the entrance is 7 to 8 feet at low water, which increases to 3 and 10 fathoms within the river, but the navigation is interrupted by banks having from 7 to 13 feet over them. Vessels when entering should keep about one-third of the width of the river from its western shore. In clear weather the white church of Batavia settlement will come in sight shortly after entering the river.

A bank, with only 7 or 8 feet water on it, stretches off from Batavia, to avoid which vessels must keep near the eastern shore, in 3 or 4 fathoms water.

About 44 miles from the entrance is a small island named Bonnie, where the channel has from 6½ to 7 fathoms in it; at 4 miles above this is a sand bank which is dry at low water. From this sand bank the river is navigable for a few miles, above which it can be ascended only by very small vessels.

The Coppename is one of the principal rivers of Dutch Guiana, but its source is unknown. The woods extend to its banks and become thicker and higher the farther the river is ascended; its banks appear to be steep-to, and a vessel's rigging may easily become foul of the trees. Many small rivers or creeks run into Coppename river, and the Coesewine, just within its entrance on the right bank, is about ½ mile wide at its mouth, with 2½ and 3 fathoms of water, carrying depths

within of 4 and 5 fathoms for several miles, and is sufficiently wide to allow a moderate-sized steam vessel to turn. This stream is not impeded by shoals, and its banks are steep-to; it may be ascended by small steam vessels, drawing 5 feet, for about 80 miles.

Tides.—At the entrance of Coppename river the tides are regular; springs rise 10 feet, and neaps 7 to 8 feet; but higher up the river they are affected by the rains.

Caution.—The shoal water fringing the shore between Coppename and Surinam rivers, is reported to extend much further to the northward than was formerly supposed.

Coast.—The coast from Coppename river to Gordon point, at the entrance of the Corentyn, a distance of about 60 miles, trends westerly, and is sandy and slightly wooded. There appear to be several small creeks and posts or plantations in this space, and the mud flat from Coppename river extends about 6 miles from the shore. When abreast some withered trees or burnt wood, a vessel (approaching from the eastward) will have passed this flat, and the shore may be approached much nearer.

Coronie.—This post, situated about 30 miles westward of the west entrance point of Coppename river, will be known by the houses on the shore and a flagstaff with the Dutch flag; in its vicinity there are several sugar and cotton plantations, the buildings of which are visible from seaward. Eastward of Coronie a soft mud bank extends 2¼ miles from the shore.

Potosie and Turtle banks.—At about 4 miles westward of Coronie is a sugar plantation named Burnside, which may be known by a conspicuous tall chimney. In its vicinity is a bank which extends from the shore about 8 miles, steep-to on the east side. With a fresh breeze there is a heavy rolling sea, by which the extent of the bank is seen. This bank is considered the most dangerous on the coast, and is much in the way of vessels working to windward. When Potosie creek (which has much the appearance of the entrance to the Coppename, but is not so wide) bears S. this bank will be passed.

Between this shoal and Gordon point there is another bank of sand and shells, named the Turtle, which extends about 4 miles from the shore. About 4 miles eastward of Gordon point is a shoal lying off a large opening in the wood, which has the appearance of the mouth of a river.

Corentyn river.—This river, dividing British from Dutch Guiana, is only navigable for vessels under 9 or 10 feet draught, which may proceed up 40 miles, to the post of Orèala; large canoes ascend to the lower rapids, about 150 miles from the sea. The entrance, between Gordon point and Mary's Hope (the northernmost British plantation

on the western shore), is about 15 miles wide, but it is dangerous to approach on account of two hard sandbanks lying in front of it.

Gordon point will be easily recognized by some straggling trees upon it which are loftier than those in the vicinity, and visible from a distance of 12 or 13 miles; it has also some buildings on it. From this the shore trends SW. by W. 7½ miles to the entrance of Nickerie river, and then SW. for 4 miles to Bluff point, when it turns abruptly to the southward, and here the mouth of the river is 4 miles wide. Abreast Bluff point, the western shore commences to trend a little to the westward of N., sweeping gradually round to NW. and W., towards Berbice river, and is so low that the tops of the trees are only just seen when in a depth of 5 fathoms water.

Bar.—The shoaler part of the bar, carrying from 7½ to 8 feet water, extends 9 miles eastward from the western shore, on the parallel of Mary's Hope; it then deepens, and there is a depth of 11 feet at 4½ miles westward of Gordon point.

With Gordon point bearing E. by N., and Bluff point S. by W. ½ W., there is a sandbank, 1½ miles long, north and south, with only 3½ feet water on it; the inner extreme lies about 2 miles from the eastern shore, bearing NW. ¾ N. from the fort at Nickerie, and in the channel between the depth is 10 feet.

At about 1½ miles westward of this bank there is another shoal known as Cameron bank, extending north and south for 7 miles, and dividing the mouth of the river into two channels. On the north extreme of this bank there is 5 feet water, but the south extreme, which lies abreast Bluff point, uncovers at half-ebb; eastward of Cameron bank there is a depth of 10 and 11 feet, and after passing within it the river deepens to 17 feet. Between Cameron bank and the western shore there is a depth of 10 feet, but the bar to the northward has to be crossed, which has only 7½ and 8 feet over it; the channel eastward of these banks is therefore the best.

A bank which uncovers at half ebb, and known as Lee bank, extends about 3¼ miles north and south and lies near the western shore of the river, at 4 miles south of Mary's Hope; the southern part of this bank is known as Creek bank.

About 3 miles southward of Bluff point is situated an island, 7½ miles long north and south and about a mile broad, lying close to the eastern bank, and known as Corao Oboro, or Parrot island, or more generally First island. A spit of 3 to 5 feet water extends from its north point, the extreme of which bears E. ¾ N. from a remarkable umbrella-shaped cotton tree on the western shore. The channel between this island and the right bank of the river is 600 yards wide and carries 9 feet water.

Southward of First island, off the opposite shore, abreast the river Molesono, there is another island, named Marietta Oboro, or Second island.

Directions for Corentyn river.—In entering Corentyn river the eastern shore should be approached gradually by the lead, and Gordon point passed at the distance of about 3 miles in 10 feet at low water. From thence this shore should be kept closer on board to avoid the outer sandbank, decreasing the distance to 1½ miles when passing Nickerie, and to ½ mile when off Bluff point. In passing the south extreme of the outer bank, care must be taken not to bring the remarkable cotton tree on the western shore to bear southward of SW. In standing over from Bluff point to the anchorage on the western shore, attention must be paid to the tidal stream, so as to avoid Cameron bank. Vessels seldom ascend the river higher than Skeldon, the southernmost plantation, which is nearly abreast the north extreme of First island.

The western channel may be taken at half flood by a vessel not drawing more than 9 feet. In this case she should run across the entrance with Mary's Hope plantation bearing about W. ¼ S., until the cotton tree bears S. by W., which must then be steered for, keeping in a depth of 11 to 16 feet.

The produce of the British estates, on Corentyn river, is carried round in droghers for shipment at Berbice.

Tides.—It is high water, full and change, at the entrance of Corentyn river at 5h. 10m; springs rise 8½ feet, and neaps 5 feet. The flood stream sets SSW. and the ebb runs out NNE. and in the rainy season the latter attains a velocity of from 3 to 3½ knots an hour to a distance of 10 or 12 miles. The edge of the stream is distinctly marked by discolored water. In the river at 70 miles from the sea the tide rises 2½ feet.

At Nickerie river spring tides rise 5½ feet.

Nickerie river.—This small stream, which enters the sea about 7 miles south-westward of Gordon point, is about 200 yards wide at its mouth and on the north side there is a village protected by a small battery. The entrance lies between two banks, the eastern of which is composed of mud and sand, and the western of mud; the channel between is divided into two by a triangular-shaped mud bank which partly uncovers; the passage on the eastern side of this bank (known as the New channel) has 7 to 8 feet in it, that on the western side (known as the Old channel) has 7 to 11 feet in it.

Both of these channels are marked by beacons.

Light.—A light is to be shown at the mouth of the Nickerie river.

Buoys.—The eastern channel of Corentyn river, off Nickerie, is marked by four buoys, the outer of which lies in 11½ feet at low water, with Bluff point bearing SSW. ½ W., Nickerie church S. ¾ E. easterly.

The middle buoy is in 12 feet, with Bluff point bearing SSW. ¾ W., and the church SE. ¾ S.

The two inner buoys are moored off the entrances to the New and Old channels.

Directions for Nickerie river.—If approaching from the eastward, vessels should pass close westward of the two outer buoys, and then steer for the buoy at the entrance of either New or Old channel.

In running in, strict attention must be paid to the lead, and on opening the mouth of the river the flood stream will be found to set strongly towards the lee banks.

The custom-house is near the town, but vessels usually load and discharge at the plantations higher up the river.

Supplies.—Provisions are very expensive, and there are few articles obtainable. The water of the river is brackish, and in the dry season the supply in the cisterns is very small.

CHAPTER III.

BRITISH GUIANA.—CORENTYN RIVER TO ORINOCO RIVER.

British Guiana.—The seaboard of the colony of British Guiana is comprised between Corentyn river and the Orinoco, an extent of 270 miles. The colony has an area of about 76,000 square miles, and is divided into three counties, Demerara, Essequibo, and Berbice—so named from the three principal rivers which drain them. Demerara occupies the center of the seaboard; to the northwest of it the county of Essequibo extends along the coast towards the swamps and forests of the western frontier; and to the southeast lies the county of Berbice.

Devil's creek.—The coast from the west entrance point of Corentyn river sweeps gradually round to the northwest for about 30 miles to the entrance of Berbice river, and is very low and slightly wooded.

At about 14 miles eastward of Berbice river is situated Devil's creek, the entrance to which may be recognized by a deep gap in the woods, and at a short distance eastward of it there is a large house with white sides and white roof. A few more houses are scattered along the shore, and their numbers increase as Berbice river is approached; they have, generally, red roofs. An extensive sand-bank extends NE. from the creek, and sometimes breaks. Eastward of it a mud flat extends nearly 6 miles from shore, and dries in some places at low-water springs.

Berbice river.—The entrance of this river is obstructed by a bar of sand mixed with mud and stones, with only 7 feet on it at low water springs; it is, therefore, only navigable at high water for vessels drawing not more than 15 feet; these may proceed as far up as fort Nassau, about 45 miles from the mouth, but those of lighter draught can ascend much higher.

A bank of hard sand and shells, steep-to, and which breaks at low water, extends NNE. about 5 miles from the east point of entrance.

A mud flat extends 6 miles NE. from the western shore at the entrance; it is steep-to and sometimes dries at low water.

The main channel into the Berbice lies between these two banks, and is about a mile wide, but the edges are not stationary.

At a short distance within the entrance points, the channel is divided into two, by a narrow wooded islet, about a mile long from north to south, named Crab island.

The western of these channels is only available for small droghers, although it is said to be deepening.

The mouth of the Berbice is protected by fort St. Andrew on the east side, and by York redoubt on the west, nearly abreast the south extreme of Crab island.

Canje river.—About 2 miles above these forts, on the eastern side of the river, is the entrance to Canje river, which is navigable for small vessels to the first rapids, about 50 miles up, and is connected with Corentyn river by a creek. About 100 yards from Canje point there is a mud bank, about 60 yards long, north and south, with 9 feet on it at low water.

New Amsterdam.—On the point which separates the mouths of Berbice and Canje rivers is situated New Amsterdam, a well-built town. It has the advantage of being cleansed by tidal canals, which considerably adds to its healthiness.

Off New Amsterdam the river is 2 miles broad, but has only a depth of about 10 feet in it; as, however, the bottom is of soft mud vessels can safely lie aground.

Light-vessel.—From the light-vessel at the entrance of Berbice river is exhibited a *fixed white* light, visible in clear weather from a distance of 10 miles. The vessel is moored in 22 feet, at 9 miles NE. by N. from St. Andrew point (the east entrance point) and may be recognized by being painted red, with the name Berbice on each quarter; the vessel is roofed over, and during daylight, carries a white flag with red ball in center.

Directions for Berbice river.—Vessels bound to Berbice river should sight the land well to the eastward, and run along in about 5 fathoms water, which will lead outside the rollers. A pilot sloop is always on the look-out off the bar, and carries a white flag with the word pilot on it.

Having waited until the last quarter flood, the light-vessel should be steered for, and on passing her, a SW. by S. course will lead between the buoys on the bar. When a remarkable tree on the low land to the eastward is just shut in with the bluff or clump of trees at the entrance of Devil's creek bearing ESE. ½ E., the water will deepen inside the bar to 18 and 20 feet, at about 2 miles within the entrance of the river.

The channel will now decrease in width, and a vessel may keep so far to the eastward as to shut in half of Crab island with the eastern entrance point of the river; and to the westward so as to open that island a little of the eastern entrance point. When about three-quarters of a mile from the east entrance point, open the shipping between it and Crab island. Having arrived off the point, the eastern shore must be kept within about 125 yards distant, and on approaching the south extreme of Crab island the steeples of the two churches at New Amsterdam must be brought to touch each other, to avoid some shoal ground extending from the southeast extreme of the island.

After passing Canje river, the course must be shaped for the anchorage (pointed out by the shipping) and a convenient berth will be found, with the northernmost church in line with the court-house, and Crab island bearing N. ½ W. Vessels drawing 12 feet generally lie aground here at low water.

Tides.—It is high water, full and change, at the entrance to Berbice river at 4h. 30m.; springs rise 8 to 10 feet, and neaps 5 to 6 feet. The flood stream sets to SW., the ebb to N.

Coast.—The coast, from the Berbice to the entrance of Demerara river, trends about NW. by W. for 55 miles, and presents no very remarkable feature. At 20 miles westward of the bar of Berbice river, is situated the mouth of a small stream named Abary river, and near it there are two clumps of trees known as Eighteen and Nineteen. When these bear S. by E. a vessel will be off the west extreme of the mud flat, which extends 6 miles from the shore between this and Berbice river.

Maicony river falls into the sea at about 4 miles westward of the Abary, and the entrance is indicated by wooded points, the land being clear of trees on either side of them.

The shore about 7 miles westward of the Maicony is fringed with trees, extending to Mahaica river, with gaps between them.

Caution.—It would be prudent to trust to the soundings when running along this coast, keeping in more than 4 fathoms water, which depth will be found at about 10 miles off shore; at this distance the tops of the trees will be just on the horizon.

Mahaica river.—The entrance of this river is about 15 miles eastward of the Demerara. On its western side there is a large sugar boiling house, with two lofty chimneys, and to the westward of it a row of cocoanut trees. At 5 miles west of the river there is a large house on the coast, named Paradise, and at the back of it is situated the Enmore estate, from the residence of which rises a white tower, sometimes seen from seaward between the trees. At about 3 miles westward of this house are Chateau Margaux and Mon Repos estates, with others, the chimneys of which may be seen from seaward above the bushes near the shore.

The rivers Abary, Maicony, and Mahaica are navigable at high water for vessels of about 6 to 8 feet draught.

Lusignan spit.—At 5½ miles E. by N. from the entrance of Demerara river is a low grassy projection named Lusignan point; from this point in a NE. direction extends Lusignan spit, with only 6 feet on it at 3 miles from the land. Vessels approaching from the SE. should be careful to avoid it.

Coast.—The objects that will be recognized in proceeding along this coast from the eastward to the mouth of Demerara river, are the chim-

neys of the estates, the groups of palm trees, and finally George Town light-house, which stands just within the fort, at half a mile from the east entrance point.

Demerara river.—This river is said to have its source in about lat. 5° N., from which it takes a northward course, nearly parallel with the Essequibo, for about 200 miles to the sea. The entrance is obstructed by a mud flat, 4 miles broad, within the depth of 12 feet, and having over the larger portion a depth of only 9 feet, but it is navigable at high-water springs for vessels drawing 17 to 18 feet. These, however, often miss the highest springs and lie aground until the next; but the mud is so soft, and the weather so fine, that no injury occurs; vessels of a little less draught generally cross the bar with the aid of tugs at any ordinary high tide; the chance of grounding being preferred to the inconvenience of completing their cargoes 9 miles off.

For about 65 miles, as far up as Luckie, the river is navigable, at high water, for vessels drawing 12 feet, and for boats to the rapids, about 95 miles from George Town.

At the mouth the river is about ¾ of a mile wide; at the Sand hills, 25 miles up, it is a quarter of a mile across; at Christianburg, 33 miles above this, it is 160 yards; and at the post of Seba, 83 miles from George Town, it is 60 yards wide.

The Sand hills, which are situated on the left bank of the river, are about 70 feet high, and appear to be the commencement of a sandy ridge, which alternately recedes from and approaches the river bank, and attains in some places an elevation of 300 feet. Below this the banks are low and thickly wooded, and when cultivated are obliged to be protected by dams and embankments.

George Town, the capital of the colony, is situated just within the mouth on the right bank of the river, occupying a space of about 1 mile in breadth and 2 miles in length from north to south. In 1881 it contained a population of 60,000.

The streets are generally wide, with canals, shaded by palm trees, running through them, and there are numerous public edifices. A railway connects George Town with Mahaica.

Dock.—There is a dry dock 230 feet long at George Town, capable, at high-water springs, of receiving vessels drawing 11 feet water.

Tugs.—The services of steam tugs for towing vessels across the bar can be obtained at reasonable rates.

Supplies.—Water has to be purchased; it is brought alongside in tank vessels, and is very expensive; this is rain water spared from the tanks in the town. There are some wells, but the water is bad. The town is supplied for all ordinary purposes with water brought from the interior by the Lamaba canal, and conveyed by pipes to the houses and wharves; this water is tinted red from the roots and leaves of the forest

trees; it is commonly termed bush water, and is wholesome to drink but not inviting in appearance. At the Sand hills there is a spring of good water; yessels may lie close under and fill by hose. Further up the river water may be taken in with the last of the ebb tide; it is quite fresh, but always muddy, and it takes a long time to settle.

All other supplies are generally obtainable in George Town, but are very expensive; firewood is three dollars a cord, vegetables are always scarce, and meat very indifferent.

Lights.—The entrance to Demerara river is marked by three lights:—

The light-vessel* off the mouth of the river lies NNE. ¾ E. distant 8½ miles from George Town light-house, in 3¼ fathoms water, and exhibits a *fixed white* light, which in clear weather should be visible from a distance of 10 miles. The vessel has one mast, and is painted red. The pilots reside on board.

A large square blue flag is kept flying by day till a vessel heaves in sight, when the flag "S" of the Commercial Code is hoisted as a signal to the light-house that a vessel is in sight.

When the light-vessel is taken into harbor for repairs a schooner is anchored in her place.

The light-house at George Town is octagonal, and painted with red and white alternate vertical stripes; it is 100 feet high, and exhibits a *revolving white* light every minute, at 103 feet above the mean level of the sea, visible from a distance of 16 miles; on the summit of the light-house there is a semaphore signal post.

Caution.—Vessels coming from seaward often sight the revolving light at George Town before that of the light-vessel.

A *red* light is exhibited from the light-house at George Town, to mark the extent of the breakwater at the northwest angle of the fort; and when visible indicates to vessels entering the river that they are to the westward and clear of the end of the breakwater. This light is visible with the light-house bearing S. by E. to SE., distant 3 to 4 miles.

Buoyage.—Two buoys are placed on the outer edge of the bar to mark the fairway on entering the river. From the western buoy (black) the light-house bears SSW. ½ W., distant 8½ miles; from the eastern buoy (black and white striped) the light-house bears SW¼S., 8½ miles.

The inner edge of the bar is marked by two buoys. From the western buoy (black) in 8 feet, the light-house bears S. by W.; from the eastern buoy (white) in 9 feet, the light-house bears SSW¾W.

Telegraph buoy.—A red buoy surmounted with staff and flag (marking the telegraph cable between George Town and Trinidad) is moored with Demerara light-vessel bearing WNW., distant about 1 mile. Vessels should not anchor in the vicinity of this buoy.

*This position of the light-vessel is the latest one received, and is nearly the same as that given on the charts, for the most westerly buoy, marking the fairway on the outer edge of the bar. The position of this light-vessel cannot be depended upon.

Pilots for Demerara and Essequibo rivers may be obtained from the light-vessel; but should there be none on board, a pilot tender is always in communication with the shore to supply one.

Anchorage.—Vessels of war are recommended to moor at the entrance of the river, where there is generally a breeze.

Directions for Demerara river.—From whatever direction Demerara river is approached, the edge of soundings or the land should be made well to windward. This must be most carefully attended to, for if a landfall be made to the westward of the river there will be great delay in getting to windward, and it must be remembered that the Essequibo banks extend a long way from the land, and are a source of considerable danger if the lead be at all neglected.

The land east and west of Demerara river is extremely low and flat, the Kurida trees, which fringe the shores of this extensive line of coast, are invariably of the same height, and the several chimneys of the sugar estates of Demerara are of the same shape and character. The navigator in making Demerara light-vessel has therefore no natural or artificial features to guide him, and the lead, latitude, and longitude are alone to be depended on.

From the westward.—Vessels bound to Demerara (or even to Surinam) from Trinidad and the Caribbean islands, should not come southward of lat. 8° N., until they can fetch well to windward of their destination, to avoid the strength of the main current. On crossing the parallel of 8° N., if in 58° west longitude, the depth will be 30 to 35 fathoms, brown sand or sand and shells; from a position in long. 58¼° W. on this parallel a SSE. course for 50 miles will pass over a bottom of fine dark sand. The depth in 7° 45′ N., after suddenly shoaling to 11 fathoms, will again deepen to 14; when the fine dark sand is passed and the light-vessel neared, the water will shoal gradually with a soft muddy bottom.

Vessels steering a SSE. course from about 8° N., and obtaining muddy bottom when on the parallel of 7° 40′ N., will be too far to the westward. As a rule, the nature of the bottom when making Demerara river from the northward should be fine dark sand.

Should the land be sighted when to the northward of lat. 7° N. it may be certain that the vessel is too far to leeward; and in working up it will be better to take advantage of the tides, anchoring during the flood stream. In this case a vessel should stand out to about 12 fathoms water, and in to 4 or 5 fathoms, according to the draught. In any position, should it fall calm it is advisable to anchor when the depth will permit.

The vicinity of Demerara may be recognized from the openings in the trees of the coast, with buildings occasionally showing, and by the chimneys rising above the woods.

From the eastward.—When abreast Mahaica river, the tops of the trees may be seen when on soundings of 6 to 8 fathoms. From thence a vessel should run to bring the light-vessel to bear SW. by S., distant about 4 miles; then steer for the light-vessel and take a pilot—pilotage, for merchant vessels, being compulsory in Demerara. The same course (SW. by S.) will lead from the light-vessel to the mouth of the river, and when the latter is opened, a S. course will lead to the anchorage abreast the town.

Until close to the entrance of the river, the ground shoals so gradually on both sides that there is not the slightest danger if attention is paid to the lead. The bank on the east side is very soft, that on the west a little harder, being partly of sand. The flood stream sets to the westward until it turns up the river, the ebb to the NE.

In making the river with the flood tide, allowance should be made, as then the current and tide combine to sweep a vessel rapidly to the westward. On all occasions a westerly set will be felt, as the ebb or NE. tide only lessens but never overcomes the direct northwesterly set.

Should the tide not serve for crossing the bar, it will be better to wait at anchor, according to the draught, near the light-vessel, to prevent being swept to leeward by the current. A vessel approaching from leeward should keep well to the northward until she can fetch the light-vessel, and from her proceed as before stated, remembering that the flood stream sets strongly to the SW.

In working in or out, when reaching to the westward, it is necessary to tack with the first shoal cast, as the bank is steeper on that side, and the flood sets strongly over the edge.

Vessels proceeding up Demerara river to the Sand hills will have to keep near the eastern shore for the deepest water. Between the estates of Herstelling on the east bank and Nismes on the west, there is a bar with 11 feet over it at low water; continue along the east side past the Great Diamond estate and up as far as the last working estate, Vriesland; the islands in the center of the river will then be in view; either side of these may be taken, keeping rather nearer the shore than the islands, for shallows run off from and lie between them. Above the islands either side may be kept near, until up to Glasgow, 2½ miles below the hills. When the Sand hills come open, a mid-channel course should be taken to the anchorage nearly abreast them, in 3½ or 4 fathoms water.

Tides.—It is high water, full and change, at George Town at 4h. 20m.; springs rise 9 feet, and neaps 4 feet. The stream attains the rate of 3 knots an hour in the dry season, and continues to flow on the surface for upwards of an hour after high water. At the Sand hills it is high water at 6h. 15m., and the rise is 9½ feet; at Christianburg at 8h. 30m., and the rise 6 feet; and at Seba the tidal steam is lost in the dry season, but there is a rise of about a foot. In the rainy months the river has been known to rise 21 feet.

The ebb and flood streams off the mouths of Demerara and Essequibo rivers run in NE. by N. and SW. by S. directions; the ebb at springs, when 15 or 20 miles off the land, attaining a velocity of 2½ to 3 knots an hour; the flood-stream from 2 to 2½ knots. To the eastward of Demerara river the tides are felt only a few miles from the shore. In lat. 6° 50′ N. and long. 57° 50′ W., with the land 10 miles distant, no tide was perceived.

Soundings.—Soundings will be found at a long distance off this part of the coast, and the depth gradually decreases towards it. On the meridian of Demerara in lat. 8° 20′ N., the depth is 60 fathoms, the 100 fathom edge of the bank lying 2 miles seaward.

Outer bank.—In lat. 7° 55′ N., long. 58° 22′ W., a depth of 9 fathoms is found, from which a bank of hard sand with black specks, having 10 fathoms over it, extends in an ESE. direction, for a distance of about 30 miles, with but little variation in depth; north of this bank the water rapidly deepens to 20 and 25 fathoms.

About 20 miles from the land the water becomes discolored, and patches of a dark suspicious hue will frequently be met with; but there is no danger; the outer limits of this discolored water, however, will of course alter as the season is dry or wet. It has been observed that in the rainy season, between Demerara and Maicony rivers, the water has a reddish tinge.

It may be useful to repeat that in front of the large rivers on this coast, to a considerable distance from the shore, the muddy bottom is mixed with shells, which is a good guide. The line of demarcation between the mud and sand bottom off this part of the coast is well defined; it takes the general direction of the coast line, and at a distance of 30 to 40 miles off.

Current.—Off the coast of Demerara the inner edge of the current may be traced as far as lat. 7° 10′ N. in long. 58° W. During SE. winds it runs nearly 2 miles an hour to the NW.; with NE. winds its direction is more westerly.

Rollers.—The rollers on this coast occur principally in December and January, when strong northerly winds prevail; they begin where the ground shoals irregularly, and sometimes are sufficiently heavy to overwhelm small vessels when caught in an unmanageable condition. As a rule the whole coast within the 5-fathom line, where sand or hard mud banks exist, is subject to these rollers, which at times are highly dangerous to boats when close to the shore.

Seasons.—At Demerara there are two dry and two wet seasons in the year. The short dry season is during March and April, and the long one from August to November. The long wet period is during May, June, and July, and the short one extends from the middle of No-

vember to the end of January. There is often a great variation in these periods, but the above may be taken as an average of several years. December and January are often very wet months; the annual rainfall is about 130 inches.

Winds.—The most unsettled and stormy months are December and January, when sometimes it blows strongly from the NE. accompanied by hard squalls and rain. During March, April, and May, the winds generally hold to the northeast, but become gradually lighter; in June and July the land wind near the coast is often accompanied by heavy rain. From August to November the wind is generally from the southeast quarter, heavy rains are less frequent, and calms of several hours duration often prevail. During these months of light wind it was found that in general it veered to the NE. in the night, backing towards the southeast in the forenoon. Vessels working along the coast should take advantage of these changes.

In the short dry season, winds prevail from NE. to E., and are squally with occasional showers. In the long dry season they are moderate from E. to SE. The mornings are generally hazy, but afterwards there is a clear atmosphere, particularly after noon. In the long wet period the wind is variable, and the weather squally, with continuous heavy rain. In the short wet season the wind blows from the eastward in November, and from northeastward in the other two months, and the squalls have intervals of fine weather between them.

During settled weather the wind draws round from ESE. to NE. about 3 p. m. daily, and continues at the latter quarter until after midnight, when it goes back again to the eastward. At the anchorage off George Town, in fine weather, the winds are generally from the SE. in the early part of the morning.

Essequibo river.—From Demerara river the shore sweeps round to the WNW. for about 10 miles to Boerisiry creek, when its direction gradually changes to the southwestward, forming the east side of the mouth of the Essequibo, the principal river of British Guiana, which rises in the Sierra Acarai, and after a course of at least 600 miles empties into the sea by an estuary about 15 miles wide. In the entrance of this river are situated the large islands of Leguan and Wakenaam, from which shoals and sand banks extend seaward. The principal channel lies between these banks and the Demerara shore, having a depth of 13 feet on it at low-water springs; there are also channels between Leguan and Wakenaam islands; and between the latter and Aroebasi, or Tiger island, which lies close off the western shore; but they are only used by droghers. Vessels of 16 feet draught can ascend to Macouri creek, about 40 miles from the mouth. The produce from the Essequibo estates is conveyed by droghers for shipment at Demerara.

The Essequibo has been ascended about 230 miles in a direct line from its mouth; the rapids and cataracts are, however, very numerous and

dangerous. The first rapid is at about 90 miles from the mouth, and to this point the river is navigable for large trading canoes. At about 15 miles from the entrance is the island of Zeelandia, upon which may still be seen the ruins of the first Dutch settlement in Guiana. About 30 miles above this the river Mazarony enters from the westward; the bed of this river is full of rocks, and the rapids are numerous. On the point of confluence there is a missionary station, named Barteke. At about 5 miles within the mouth of the Mazarony, the Cuyuni, which also enters from the westward, communicates with the Orinoco, and is navigable for about 300 miles.

A short distance below where the Cuyuni enters the Mazarony the north bank rises to the height of about 100 feet, and on this is placed the penal settlement.

About 5 miles below the confluence of the Essequibo and Mazarony the Boessel and Macouri creeks enter from the eastward. Vessels drawing 16 feet sometimes load here.

Penal settlement.—This is a place to which all the worst felons of Demerara are sent for isolation from the colony. It is a well-ordered establishment, and partly industrial; granite exists in this locality, and is broken out by the convicts for shipment to George Town, for the construction of sea walls and other purposes. Hard woods are also cut and shingles made. The settlement is supplied every month from George Town by steam vessels, and at the same time officially inspected.

Ship channel.—The main channel into the Essequibo is situated between the southern shore and Leguan island, the eastern part of which lies nearly opposite, and is 3½ miles distant from Boerisiry creek. From the entrance of this creek a coarse sand-bank (Red bank), which uncovers in places, extends NE. by E. for 7 miles; and from the northeast extreme of Leguan island, a dry bank (Leguan bank) runs off in the same direction for 3 miles, eastward of which a bank, with 2 to 10 feet water over it, extends 7 miles. Between these banks lies Ship channel which is from ½ to 2 miles wide, with depths in it of 13 to 17 feet.

Sugar bank.—This bank of hard sand lies in the fairway of Ship channel; its NE. extreme is situated N. ½ W. 10 miles from the entrance of Demerara river.

Beacons and buoys.—The entrance of the main channel into the Essequibo lies between Sugar bank and the shallow grounds south of it.

The northern side of the channel is marked by two beacons and a black buoy. The eastern beacon stands in 6 feet of water on Sugar bank, 9⅜ miles N. by W. from George Town light-house; the black buoy is on the southern edge of Sugar bank 2 miles SW. from the beacon, in 12 feet water; the western beacon stands on the dry sand of Leguan

bank, 11¾ miles NW. ½ W. from the light-house, and 2⅝ miles ENE. from the eastern end of Leguan island.

The southern side of the channel is marked by two beacons and a red buoy. The eastern beacon stands on the dry sand of Red bank, 8½ miles NW. ¼ N. from George Town light-house; the western beacon lies 3 miles SW. by W. from the eastern one, and 9¼ miles NW. by W. ¼ W. from the light-house; the red buoy lies in 10 feet water 2½ miles ENE. ½ E. from the eastern beacon.

Directions for Essequibo river.—From a position a short distance north of Demerara light-vessel, a W. course will lead to the buoys at the entrance of Ship channel, and having passed between these, the beacons on the dry sands with the island of Leguan and the land about Boerisiry creek, will be in view. The entrance of the river will now be open, and should be steered for, the only caution necessary being to keep at a sufficient distance from the southern beacons, as shoal ground extends nearly half a mile from the outer, and from the inner one mile.

The sands on both sides of the channel are too steep to be approached by the lead; in working out, bearings of the beacons must be taken.

There is an inshore channel at high water for small vessels; it lies between Boerisiry bank and the first beacon outside it; this channel is marked by two small beacons.

Vessels sailing up, or working out of Ship channel, should always keep north of Middle bank, which is nearly midway between the shores. In sailing up the wind is invariably free.

To clear the bank extending off Leguan island, keep Blenheim chimney (next NE. of Enterprise) well open of Enterprise stelling; this also leads clear of the dry part of Middle bank.

When working down, attention must be paid to the ripple on the banks as well as to the leading marks; the black buoy on Middle bank must not be approached too close, as the bank is very steep.

As a rule, the Leguan island shore should be kept near, until a vessel can clear the Middle bank.

Anchorage.—Westward of the Sugar bank, in Ship channel, there is good anchorage in every part; the tides, however, are very strong, causing a confused and dangerous sea for boats.

Middle bank.—This bank lies nearly parallel to either shore, and is a ridge of broken sand, having from 5 to 10 feet over it, with the exception of a small dry patch, the south end of which bears E. by S. 1½ miles from the south end of Leguan island; a black and white buoy in 9 feet marks the south-western edge. On the eastern side of the channel, lying eastward of Middle bank at 200 and 400 yards off shore, are two buoys, red and black, marking the ends of a narrow bank of sand with 5 to 11 feet on it. These buoys are placed for the use of the local steam vessels on their passage to the penal settlement.

Middle channel.—Wakenaam island, 9 miles long and 3 miles wide at the north part, lies northwestward of Leguan island, from which it is separated by Middle channel, the average breadth of which is 1 mile. The bar, with 4 feet on it, lies 6 miles seaward from the northeast extremes of Leguan and Wakenaam islands. A small island, named Kiwakewaraba, lies NE. by E. distant three-quarters of a mile from the east extreme of Wakenaam island, and close to the northern edge of the channel. From this island the sand-bank trends E. by N. for 2 miles, forming the north side of the channel; the southern side is defined by an extensive sand-bank, 4½ miles long, stretching off the northern extremeof Leguan island, in a NE. by E. direction. No leading marks can be given for Middle channel, and the tops of the chimneys seen over the Kurida trees are difficult to distinguish one from the other. From the bar the water gradually deepens to the southwestward, there being 19 feet between the northeast extremes of the two islands, again shoaling to 11 feet between the southern extremities.

Hog island.—The northern extreme of this island lies between the south points of Leguan and Wakenaam islands; the channel formed between it and Leguan island is clear, having 10 to 20 feet in it at low water, and being nearly half a mile wide. A dry spit extends off the northern extreme of Hog island, the outer edge lying half a mile off shore, and marked by a circular white beacon, which is placed in 8 feet at low water; a beacon is also placed on the eastern edge.

The channel between Hog and Wakenaam islands is narrowed by a shoal extending off the latter island, and by a sand-bank, with only one foot over it at low water, lying in mid-channel south of the southern point. A black buoy and a red buoy mark the channel, which carries a depth of 8 feet, and a small tub beacon is placed close off the southern edge of Wakenaam island, marking a very small spit. Square-rigged vessels should not attempt this intricate channel; the buoys and beacons are only placed to guide the passenger steam-vessels which ply three times a week between George Town, Leguan, Wakenaam, and the Arabian coast.

West channel.—The entrance to this channel is almost out of sight of land; only in the clearest weather the chimneys on Wakenaam and Tiger islands can be seen. The Estate chimneys to the westward are no guides to the entrance.

The eastern side of West channel is formed by the edge of a sand-bank, stretching off Wakenaam island to a distance of 7 miles. There is a depth of 10 feet in the entrance, but southerly from No. X. beacon the water gradually deepens; at 6 miles within the entrance there are 13 and 14 feet, the width being 2 miles. Between Zeelandia and the south extreme of Tiger island, the soundings show a depth of 20 and 24 feet.

The inner part of West channel is formed by the west side of Wakenaam island, parts of the Arabian coast, and the east side of Great Troolie island.

No. X. beacon.—In latitude 7° 11′ 45″ N., longitude 58° 24′ 15′ W., is placed a large triangular black beacon (locally known as No. X.), in 7 feet at low water; at ¾ of a mile NE. of this beacon the depth is only 7 feet. Southeast of the beacon, distant ¾ of a mile, is a bank which dries at low water, and breaks heavily even in moderate weather; between is the entrance to West channel, with 10 feet in it at low-water springs.

Zorg beacon, situated on a bank which uncovers at low water on the western side of West channel, bears from No. X. beacon SW. by S., distant nearly 5 miles; at a ¼ of a mile S. from Zorg beacon is an old beacon; between these is a shallow channel of 3 and 4 feet.

Tiger island, situated on the western edge of West channel, is 5½ miles long, north and south, by ½ mile in width; the southern extreme bears WSW. ¾ W., distant 2 miles from Zeelandia. The southern and eastern sides of this island are faced by sand, which gives it a conspicuous appearance, in contrast with the monotonous coast to which it is adjacent. On the eastern side, at 1½ miles from the northern extreme, there is a particularly white sand-bank, 3 feet above high-water; this shows distinctly from all points of view. The sand dries ½ mile off this bank, forming the western edge of the channel.

Sand bank.—On the eastern side of the channel, at ½ mile from the western side of Wakenaam island, is a narrow sand-bank, which uncovers at low water; it is very narrow, and ½ mile in length, extending parallel to the eastern shore, with a good channel between; the center of the bank bears SSE., distant 1¾ miles from the south extreme of Tiger island, and SW. ½ S. distant 2 miles from Zeelandia.

Shallow water with one small dry bank extends from this bank parallel to the shore for 1 mile. A black buoy is placed on the southwestern extreme.

On the western side of Wakenaam island is the conspicuous stelling, painted white; a court house is erected near the extremity which shows out very distinctly; it is situated 4 miles from the south point. The southern part of west channel, east of Great Troolie island, is only ¾ of a mile wide, in some places being 10 fathoms deep. Westward of the southern part of Wakenaam island, a shallow bank marked by two small beacons, extends parallel to the shore, the depth over it varying from 1 to 8 feet, leaving a channel eastward of it ⅛ of a mile wide; this is used by steam vessels to avoid the strong flood stream which sets in mid-channel. The north extreme of Great Troolie island bears WSW., distant 1¾ miles from Good Service stelling on Wakenaam island, the channel between being clear, with a depth in it of 20 feet. Off the north extreme

of Great Troolie island a sand-bank extends more than ½ mile; this is very steep, having 3 fathoms close to.

That portion of the Arabian coast which may be said to form the western side of West channel lies opposite the central part of Wakenaam island; the only two conspicuous estates on this coast are Aurora and Spring Garden, the latter being the most southern cultivated spot on that coast; it is distant from Zeelandia 3½ miles in a southwesterly direction. From the south extreme of Tiger island, and almost parallel to the coast, extend detached narrow sand-banks, with channels among them having depths of 2 or 3 feet at low water; that through which the passenger steam vessels pass is marked by a white beacon, with a circular top, lying S. by W., a little over ½ mile from the south extreme of Tiger island; the channel between Tiger island and the mainland has an uniform depth of 16 and 17 feet, with a breadth of less than ½ mile; the entrances to this channel, both north and south, are very shallow.

When working out of West channel, the shore of Great Troolie island must be kept on board; the two small beacons west of Wakenaam island point out the long narrow ridge running parallel to that island, and short tacks must be made until the north extreme of Great Troolie island bears WNW., when Wakenaam island may be approached. Avoid the spit extending off the north extreme of Great Troolie island. A vessel could easily work up to Zeelandia by hugging the west side of Wakenaam island, tacking short of the sand ridge which lies a little more than ½ mile off shore. The black buoy lying N. ¼ W., distant 1⅓ miles from Good Service stelling, is a guide to the southern part of the bank. A vessel beating up in mid-channel must be guided by the lead.

Caution.—Neither West nor Middle channels can be recommended as suitable for vessels to run into. Formerly vessels of small draught attempted West channel, but owing to the number of casualties that happened, and the great damage done to cargo, it has been totally discontinued. The passage from George Town to the stelling occupies four days, and sometimes a week; as before mentioned, it is not safe to try the intricate channel between the north point of Hog island and eastern side of Leguan, consequently Hog island has to be rounded on the southern side, which entails a very tedious passage.

Tides.—In the mouths of the Essequibo the tidal streams run from 3 to 3½ knots an hour, even in the dry season, and their influence is felt as far up as the first rapids. The rise at springs is from 8 to 9 feet.

Pomeroon river.—The coast from abreast Aroebasi or Tiger island, on the western side of the entrance of the Essequibo, takes a northerly direction for about 12 miles, and then sweeps round to the northwest to cape Nassau, the east entrance point of the Pomeroon, which is about 64 miles from Demerara light-vessel. The entrance of Pomeroon river is open to the northwest, and between cape Nassau and the shore oppo-

site it is about 1½ miles wide; the banks are low and covered with wood, and it is so shallow as to be only available for small craft. But little is known respecting Pomeroon river, though it was here that the Dutch first settled and erected a town named New Middleburgh (now in ruins), about 40 miles from the mouth. The country is said to be wooded and it has a rich soil, adapted to the growth of sugar cane.

Coast.—From Pomeroon river the shore trends NW. for about 80 miles to the entrance of the Guayma. It is very low and densely wooded, and mud and sand flats extend to a considerable distance from the land. The only remarkable object upon it is a grove of cocoanut trees, to the westward of Cocoa point, where a bay is formed, about 36 miles from the Guayma. This bay or opening may be the entrance of the river Bayne, although it is stated that the only stream which flows into the sea between the Pomeroon and Guayma is Morocco creek, about 5 miles NW. of the Pomeroon.

The interior is intersected by immense lagoons and swamps, and the Indians are obliged to erect their huts on the stumps of trees a few feet above the level, and communicate with each other by means of canoes.

Guayma river.—The entrance of this river faces the NW., and is about 2 miles wide, with a depth on the bar of only 6 feet at low-water neap tides, increasing just within the mouth to 13 feet. From the east entrance point a bank of sand and shells, that breaks heavily, stretches off about 2 miles; and, at nearly ¾ of a mile westward of the point, a bank of shells, which has 11 feet close to, dries at half tide.

Caution.—The entrance of the Guayma may be recognized by three remarkable trees on Brand point, about 2 miles from the mouth, on the western shore, described by most navigators as three hills. Behind them are low bushes, and to the north and south thick forests. Great care should be taken in approaching this part of the shore, for on Guayma bank lying NE. by N. from the entrance to the river, there is only a depth of 10 feet at the distance of 10 miles from the land. A vessel in passing should therefore not come within the depth of 4 or 5 fathoms.

Tides.—It is high water, full and change, at the entrance of Guayma river at 4h. 10m., springs rise 7½ feet. The flood stream sets across the entrance to the SW., the ebb to NW.

Corocoro islands.—From Duck point, at the entrance of Guayma river, the coast trends NW. by W. for 26 miles to Mocomoco point, and about midway, close to the shore, are the Corocoro islands; all this part of the shore is but imperfectly known, and shallow flats of mud, sand, and shells extend out of sight of the land.

Orinoco river.—The outer edge of the delta of this great river extends along a seaboard of about 150 miles. In this space are the

mouths of six considerable streams, which become united to the main trunk about 100 miles within its eastern mouth; but the latter is alone navigable for vessels of moderate draught.

The southern shore of the mouth of the Orinoco from Mocomoco point takes a W. ½ S. direction for 9 miles to Sabaneta point, and from thence it trends WSW. 5 miles to Barima point at the mouth of the Brazo de Barima. This river communicates with the Guayma by Mora creek, which is navigable for large canoes. The trees about Mocomoco point are higher than usual on this coast, and visible from a distance of at least 15 miles in clear weather; between Sabaneta and Barima points they continue high, whilst those on the western side of the entrance are low and broken. Barima point appears as a clump of trees, about double the height of those adjacent, and it may be easily known, as Cangréjo island shows above water when abreast it; Sabaneta point cannot be recognized when approaching from the northeastward. At about 10 miles southwestward of Barima point is the entrance of the river Amacura, which forms the boundary between British Guiana and Venezuela.

The navigable entrance of the main branch of the Orinoco—generally termed the Boca Grande—between Barima point and Cangrèjo or Crab island, is about 10 miles wide, and on the bar there are 16 feet at high water, which depth is very little affected by the annual rise and fall of the river. Westward of the entrance of the Barima the shore forms a bay to the southward, and the mouth of the Orinoco between Cangréjo island and the main is about 4 miles across; the south extreme of Cangréjo island appears as a bluff, and is readily made out.

The southern of the six streams which intersect the delta of the Orinoco, named the Loran, enters the sea at about 24 miles northward of the Boca Grande, and is navigable for small vessels. Mariusas river, the next north, is about 54 miles northwest of Loran river. The third north, named Macareo river, about 12 miles farther in the same direction, is also navigable for small vessels. Capure or Cuscuina river, 18 miles westward of this, and opposite to the southwest extreme of Trinidad island, is only fit for canoes. Pedernales river, which is 18 miles farther west, will admit long-boats. Grand Manamo, or the river Vagre, is the westernmost, and flows into the southern bight of the gulf of Paria.

The depths in all these streams, however, naturally change with the seasons, and during the rains (from the latter part of January to the middle of June) the northern part of the delta to the westward of Mangles point is submerged, and the inhabitants are obliged to reside in the trees. The four last-named branches unite near the town of Barrancas, and enter the Orinoco about 100 miles above Cangréjo island.

Light.—A two-masted light vessel painted *red* is moored in 3 fathoms water, between Sabaneta bank and Barima point, 7 miles from the latter, from which is shown, at an elevation of 50 feet above the sea, a

fixed white light, visible in clear weather 9 miles. Position: Latitude, 8° 42′ N.; longitude, 60° 20′ W.

Pilots.—A number of pilots are stationed on board the light-vessel. There are also said to be pilot stations on Cangréjo island, and at the village of Curiapo, on the left bank of the river, about 37 miles from Barima point. No pilot boat cruises outside the Boca Grande. Should a vessel visit Demerara prior to proceeding to the Orinoco, it is recommended that inquiries should be made for a pilot there, and no vessel should attempt to enter the branches of Orinoco river without one.

Water.—The confluence of the river Caroni, a little above the village of Las Tablas (165 miles within Barima point), is an excellent place for watering, its water keeping clear and transparent amidst the turbid waters of the Orinoco for a considerable distance, though the latter is by no means unpalatable or unwholesome, being drinkable as far down as Cangréjo island.

Directions for the Orinoco river.—Sailing vessels bound to the Orinoco should endeavor to make the land well to the eastward, and sight the remarkable trees at the entrance of Guayma river. This, however, requires great caution, for they only become visible when in 2½ or 3 fathoms water. If this be not done there is great danger in approaching the entrance, for a vessel may be suddenly aground out of sight of the land, and if to leeward there will be much difficulty in working up against a northwest current of 1½ to 2 knots an hour. Steam vessels should, however, endeavor to make Mocomoco point, which from its salient position cannot be mistaken; and if the land be first seen to the westward of this point, haul out.

The depth gradually decreases towards the shore, but to the northward of Sabaneta point at the entrance of the Orinoco there are only 2½ fathoms when nearly out of sight of it. Mocomoco point may be approached to the depth of 3½ fathoms, but between it and Sabaneta point is a shoal of soft mud.

When entering and having the land of Mocomoco point in sight, steer to the westward, keeping about 12 or 13 miles off shore. When Barima point bears S. by W. steer for it, and the least depth of water over the bar will be 16 feet. When across the bar the depths will increase to 4 and 5 fathoms; care must then be taken to avoid the bank extending from Cangréjo island, which projects far into the channel. The course in mid-channel will be between SW. and SW. by W., observing to keep in clayey bottom, which will be found towards the mainland.

From off Barima point the course will be about W. by S. towards Cangréjo island, until the east extreme of it bears North or until the southeast extreme of the island covers some small woody clumps or islets lying off the northeast end, when a vessel may haul up for the mid-

dle or southwest point of the island. At half a mile westward of the pilot's house on the beach, which is very conspicuous, will be found a depth of 4 and 5 fathoms.

Above Cangréjo island the channel leads through a labyrinth of islands, not sufficiently marked to be known to strangers; the discolored water prevents the banks (which are steep-to) from being seen, and as the rise and fall of the river alters the appearance of the land, and anchorage is required at night, the ascent of the river without a pilot is difficult and dangerous.

Bolivar.—Should a vessel proceed to Ciudad Bolivar (Angostura), the cathedral on a hill, being very conspicuous, may be seen 10 miles off. The river at this point is extremely deep, and the anchoring ground contracted in consequence. The best anchorage is to the eastward of Market-place point, opposite the club-house, where, however, a vessel must moor head and stern, and near the beach, in 10 fathoms. At a short distance from the shore are 18 fathoms, at the mean level of the river; and in mid-channel soundings cannot be obtained, except in the dry season, in consequence of the great velocity of the cross-currents; the extreme depth at this period is stated to be from 30 to 50 fathoms.

The current in these narrows runs about 5 knots an hour in December when the river is at about half ebb. The width between Market-place point and the rocks below Soledad, on the left bank of the river, is 776 yards at the mean level, but above as well as below these narrows it not unfrequently expands to 3 miles. Market-place point is in latitude 8° 9′ N., and longitude 63° 33′ W., and is 228 miles from Barima point.

In leaving the river there will be no difficulty by bringing Barima point to bear S. by W., and keeping it on that line. Several vessels have steamed out with Barima point bearing SSW., carrying not less than 15 feet water.

Winds.—Strong winds from the westward are experienced at Bolivar from July to October, and during the rest of the year their direction is NE.; sometimes in December smart squalls from the northward come on.

Fuel.—Coal cannot be obtained at Bolivar, but firewood is plentiful, and is used by the river steam vessels.

Caution.—The muddy water at the entrance of Orinoco river, apparently elevated by mirage, is easily mistaken for the land; heavy rollers sometimes occur off the mouth of the river in November and December.

Should the weather be thick when approaching the entrance to Boca Grande, a vessel should not stand into less than 5 fathoms water.

Currents and Tides.—In Orinoco river the periodical rise of the water commences immediately after the vernal equinox; but during the

first month it does not exceed an inch in 24 hours, and sometimes it falls again in April. In July the river attains its greatest height, and remains at the same level till about the 25th August, when it gradually falls, and reaches its lowest state in January and February. The ordinary rise in the Lower Orinoco is estimated to be from 50 to 60 feet; the height, however, naturally varies according to the breadth of the bed, and the number of tributary streams received by the main trunk.

During the period of rise, the river is navigable to Ciudad Bolivar (formerly Angostura), a distance of about 250 miles from the sea, where the rise above mean level is 24 or 25 feet, and the annual difference of level not less than 53 feet. Formerly in the dry season vessels were obliged to stop about 40 miles lower down, below the bar or pass of Del Maño, which at this time had only 4 or 5 feet water in it, and transport their cargoes to the capital in canoes; but this pass has now 10 or 12 feet water over it when the river is at its lowest.

At Barrancas, which is about half way from the entrance to Bolivar, the river falls 40 feet between July and November, and here the creeks unite into a single channel from 1 to 3 miles wide, with a general depth in it of 7 to 20 fathoms; but many sand-banks, most of which are above water in the dry season, and occasionally masses of granite, form little islands in the stream.

When the river is at its lowest level the tide is felt at Bolivar, causing a rise and fall of 12 or 14 inches; and about 165 miles up, at the confluence of the Caroni, the rise is 15 inches. The depth in the passes varies from year to year, and can never be depended on.

At Barima point it is high water, full and change, at 6h. 0m., and springs rise about 3 feet; at 30 miles above this the flood will make at 2h. 20m. At the mouths on the edge of the delta, westward of Mangles point, the rise is 7, 8, and even 10 feet within the gulf of Paria. At 6 or 7 miles northward of Mocomoco point, the tide runs about 6 hours each way, the flood to the WSW., and the ebb to NNE.

Macareo river.—This branch of the Orinoco (about 100 miles northwest of Boca Grande) is entered over a bar with 10 feet on it, extending 5 miles from the land; when inside, the depth increases to 5 fathoms, and the navigation is easy as far as Zebirgo point, off which there is a long spit where the water is shoal and the channel narrow; this point is at the junction of the river Pedernales. The river again deepens southward of this until nearing the junction with the main stream, where it again shoals to 12 feet for about half a mile in the Mata-Mata pass.

This entrance to the Orinoco is the best for steam vessels of less than 8 feet draught, and pilots can be obtained at Trinidad.

In the month of April, off the main branch of the Orinoco, the water is sometimes fresh at 15 or 20 miles from the land.

The following is a table of river distances on the Orinoco, by Lieut. J. Murray, R. N.:

	Nautical miles.	Distance from Barima point in nautical miles.	
Barima point to Cangrájo	12	12	Pilot establishment.
Cangrájo to Curiapo	25	37	Indian village.
Curiapo to Pass of Yaya	85	122	Apex of delta. Macareo river branches off towards Trinidad, and is much frequented by small craft.
Pass of Yaya to Barrancas	4	126	Considerable trade in cattle.
Barrancas to Guayana Vieja	17	143	Deserted capital.
Guayana Vieja to Las Tablas	19	162	Considerable trade in cattle.
Las Tablas to Pass of Maño	31	193	A depth of 10 or 12 feet at low water.
Pass of Maño to Pass of Rosaria	13	206	Deep, but dangerous, eddies and many rocks.
Pass of Rosaria to Pass of Panopano	6	212	Not less than 13 feet at low water.
Pass of Panopano to Bolivar (Angostura).	16	228	Capital of the province.
		Distance from Bolivar.	
From Bolivar to Muitaco	62	62	Village on the right bank.
From Muitaco to Quanàre	17	79	
From Quanàre to Boca del Infierno	12	91	River rushes through a rocky pass 156 yards wide, and deep, eddies very dangerous, especially when the water is high.
Boca del Infierno to Mapire	16	107	Village on the left bank, the river 1,657 yards wide and 8 fathoms deep.

CHAPTER IV.

TOBAGO, TRINIDAD, AND GULF OF PARIA.

Tobago island is about 23 miles in length, NE. by E. and SW. by W., and 6½ miles across at its greatest breadth; the shores being generally bold and steep-to. A ridge of irregular mountains, commencing at the northeast extreme, extends through the island for nearly two-thirds its length at an elevation, in some parts, of 1,900 feet, it then declines in height, and the southwest part of the island terminates in broken hills and low lands. The summits of the ridge are generally rounded, and do not present any of those volcanic features that are seen at the neighboring islands to the northward; the valleys are well watered and some are cultivated.

The produce of the island consists of sugar, molasses, and rum. In 1877 Tobago contained a population of 18,376.

Caution.—The southeast side of Tobago island is continually exposed to a heavy swell, and as the current generally sets very strongly towards the shore, it should not be navigated within the distance of 3 or 4 miles.

Giles or Melville islands.—These bold rocky islands lie half a mile off the NE. extreme of Tobago island; they are steep-to. The westernmost rock is remarkable, having an arch worn through it by the sea; it is known as London Bridge rock. The north rock, Marble island, 146 feet high, is nearly white.

The southern and largest island is 400 feet high.

Rock.—Midway in the channel, between Tobago island and Giles island, there is a rock awash; a deep channel lies on each side of it, but they are so narrow, and with such strong tides in them, that a vessel should only take this passage in the last extremity.

Man-of-War bay.—This bay, 1½ miles wide at the entrance, is situated 2 miles SW. by W. from Giles islands, and has anchorage ground for a large number of vessels in the eastern part in 20 to 10 fathoms water. The only danger in this bay is Cardinal rock, awash, lying 400 yards off the western shore; it generally breaks, and is easily avoided. At the head of the bay a small islet, named Booby island, is steep-to on the outside, but has shallow ground within; along the eastern and southern parts of the bay there are also some fringing reefs close to the shore.

Supplies.—Water may be conveniently obtained from a stream at Charlotte Ville, in the eastern part of the bay. Wood also is plentiful.

Directions for Man-of-War bay.—A sailing vessel entering Man-of-War bay should keep one-third of the width of entrance from the eastern point, and stand over quite close to Booby island on the first tack, being prepared when in the bay for baffling and irregular winds. Should she fetch to leeward of Booby island, tack when it comes on with the north extreme of the long sandy bay on the eastern side, and when standing northward avoid getting becalmed under the NE. entrance point, near which eddies from the westward might press a vessel close to the rocks.

The best anchorage for large vessels is in 11 to 15 fathoms, with Booby island bearing from SW. to WSW.; small vessels may go nearer the shore. This anchorage is perfectly safe.

The Brothers are two rocks 15 feet in height, lying 2 miles W. by S. of Corvo point, the west entrance point of Man-of-War bay, and 600 yards off shore. There are other rocks which uncover between them and the land, therefore a vessel should never attempt to pass inside.

The Sisters are a group of five rocks above water, with three breakers, lying WNW. ½ W., distant 1½ miles from the Brothers, and 1½ miles off shore; the highest rock is 98 feet above water. These rocks should not be approached in light winds, for the current sets strongly towards them.

Rocks.—Between the Brothers and Sisters, at half a mile from the shore, there are two dangerous rocks, one of which uncovers, and the other has 4 feet on it; they are generally breaking, but not always. In passing between the Sisters and the shore (which channel is not recommended) keep near the Sisters to avoid these rocks.

Anchorages.—From Corvo point to Courland point, about 14 miles distant, the northwest shore of Tobago island is generally rocky, bold, and steep-to. In this space are several small bays, known as Bloody, Parlatuvier, Englishman, Castara, King Peter, and Formagier bays, all of them affording anchorage for very small vessels, but, with the exception of Castara bay, not very secure; several rocks lie off this shore, but in no case over 200 yards distant.

Great Courland bay.—This bay is the principal anchorage on the northern side of Tobago island; between Courland and Black rock points, it is nearly a mile wide and ½ mile deep, with soundings gradually increasing from the shore. The only danger is the Barrel of Beef rock which uncovers 2 feet and lies 300 yards SW. of Courland point; it sometimes breaks, but not often. This bay is subject to a ground swell, and vessels should not anchor within a depth of 7 fathoms; large vessels should anchor in 10 fathoms. A steam vessel can enter Great Courland bay at night after having made out its position, and it can be left

with great facility. With the wind north of east a swell sets into the bay, but the holding ground is good.

Water.—A stream flows into the northern part of Great Courland bay; good water may be obtained from it, a little within the mouth.

Stonehaven bay.—This indentation between Great and Little Courland bays is very open, and not good for anchoring in.

Little Courland bay, the next opening to the SW., is a smoother anchorage than Great Courland bay, being protected by a more salient eastern entrance point, on which are the remains of an old Dutch fort. The produce of the vicinity is shipped in this bay. The anchorage is in the eastern part of the bay in 7 fathoms, WNW. from the central rocky point on which stand the buildings of the Mount Irvine estate. In leaving this bay, if the wind be light and variable, care is required to prevent being set towards Buccoo reef, the current generally running strongly to the southwestward.

Buccoo reef.—This reef extends in patches, forming a semicircle to the northward from Pigeon point to Wolf rock, which lies off the western entrance point of Little Courland bay. Its greatest distance from the shore is 1¼ miles; the edge uncovers and is clearly defined. At night this is a dangerous reef; it may be avoided, when the land cannot be seen, by keeping in a greater depth than 30 fathoms.

Buccoo bay.—This bay, situated within Buccoo reef, is dangerous for boats, as rollers set in suddenly over the shallows inclosing it; several accidents have occurred, and the shoals are known as the Buccoo burial ground.

Milford bay.—This bay, situated at the west end of Tobago island, between Sandy and Pigeon points, affords very good anchorage; a rock of 1 fathom depth lies 300 yards from the shore near the middle of the bay. In standing into this bay from the northward or southward, care must be taken not to round either Buccoo reef or the ledge off Crown point too closely. Anchor in 7 to 10 fathoms W. by S. of the only house on the beach.

Little Tobago island.—This island, 470 feet high, lies 1 mile off the east extreme of Tobago, and 3 miles SSE. of Melville islands; it is high, and makes in four or five hills. Near it are several rocks above water, and a small island named Goat island is situated between it and the shore.

Channels.—Between Little Tobago and Goat islands, and between Goat island and Tobago, there are deep channels, but the current in them runs so strongly to the northward that sailing vessels should never attempt to pass through; nor should steam vessels do so, unless they have fair power and a particular object to attain.

Tyrrel bay.—This bay, situated inside Goat island, affords indifferent anchorage with deep water, though vessels of 150 tons sometimes ship produce here. To enter it a commanding breeze is necessary, and the southern channel is the only safe one to take. When entering incline towards South rock (18 feet high and lying S. ¾ W. of little Tobago southwest entrance), but do not attempt to pass between any of the rocks lying north of South rock and Little Tobago, as the current splits amongst them and is very strong. When leaving, a sailing vessel should wait until the wind inclines to the NE., she will then stand out on the port tack, with the current checking her under the lee bow.

Coast.—Between Tyrrel and King bays, the coast is rough and dangerous for boats or vessels to approach, owing to the current constantly setting against the wind.

King bay is the deepest and safest indentation in Tobago, it is the only anchorage that has almost always smooth water. Detached shoals of 8 and 5 fathoms lie in it, and shoals of less water fringe the shore, with an isolated shoal of 3¼ fathoms on the eastern side.

The best anchorage is in the NE. part of the bay, in 7 to 10 fathoms water, secure from all ordinary winds.

As King bay is surrounded by high land, the wind, when quite steady outside, will be very uncertain within; for, as soon as Pedro point (the east entrance point) is passed, calms and baffling winds will probably be met with. Always be prepared to anchor, and do not stand too close to the lee side when turning in. When leaving choose early morning, as the wind then generally blows out of the bay, but be prepared on opening Pedro point for changes in its direction.

Queen bay.—Off the southern part of the land which forms the west entrance point of King bay lies Queen island, at ½ mile NW. of which is Queen bay anchorage, fronting the estate of Betsy's Hope. This anchorage is almost always accessible, and is easy to leave, but it is only suitable for moderate sized vessels.

Two beacons, triangular and painted white, have been erected to serve as a leading mark between the 15-foot shoals on either side of the entrance to this bay; the northern is situated a little west of the residence of Betsy's Hope, and the southern is on a low mound nearer the shore; when in line they bear N. ¾ W., and lead a little westward the weather shoal.

The anchorage is in 5 or 6 fathoms, at about 400 yards off the beach.

Prince bay forms a continuation of Queen bay to the westward; Roxborough rock, 53 feet high, with a shoal of 2 fathoms lying 400 yards westward of it, and a series of shoals between it and the shore, divides these bays from each other; a rock, awash on the east extreme of a 3-fathom shoal, lies ½ mile SW. by W. of Roxborough rock, and between them is the entrance to Prince bay. To enter, pass a little to

windward of the rock awash, from which a N. course leads to a good position in 7 fathoms.

Inside the depth of 5 fathoms the ground is foul all round this bay; it should not be entered with a scant wind, and it would be well to obtain a pilot from the vicinity, but not to trust him entirely.

Coast.—From Prince bay to Richmond island the shore is fronted by many rocks; a vessel should avoid this locality.

Richmond island.—This island situated 2½ miles SW. by W. of Queen island, lies 400 yards off a salient point; it is a double island, with a hummock on each part, and a group of rocks near its east extreme.

Mangrove bay.—To the NW. of Richmond island, within the salient point above mentioned, is Mangrove bay, which affords a secure anchorage for small vessels. A rock which uncovers lies directly in the entrance; pass to leeward of this, and anchor inside it in 3 or 4 fathoms.

Richmond and Goldsborough bays.—These indentations, lying southwest of Mangrove bay, have very irregular ground off them; small vessels (droghers) anchor in them to load sugar, but there is no good anchoroge for large vessels.

Great River shoal.—Smith island, 48 feet high, is small; it lies nearly 4 miles SW. by W. of Richmond island, and between them, off Goldsborough bay, lies the Great River shoal which extends from the shore 1¼ miles (within the depth of 5 fathoms), and has in many places depths of 17 and 18 feet over irregular coral ground.

During strong ESE. breezes this shoal breaks heavily nearly all over.

A rock, known as Little Smith island, lies about 200 yards WSW. from Smith island.

Directions.—When passing Great River shoal, the east extreme of Little Tobago island kept open of Pedro point leads ¼ of a mile SE. of it; large vessels should keep the eastern hill of Little Tobago open.

Penfold bay, just northwest of Smith island, is unfit for any description of vessel as an anchorage.

Barbados bay, 1 mile westward of Smith island, lies inside Granby point, west of which are several 2-fathom shoals, the outer bearing W. ½ N. distant ½ mile from the point.

A shoal of 3 fathoms lies SW. ½ W., distant 800 yards from Granby point, and in a direct line between this and Smith island are two shoals of 2½ and 2 fathoms, respectively.

Directions for Barbados bay.—To enter Barbados bay, bring the west end of the sandy beach in line with Green Hill house (above Studley Park house), until Little Smith island is shut in behind Granby

point; then haul up quickly for a weather position in the bay; in doing this the vessel will probably get into 15 feet. This bay is not suitable for vessels drawing more than 12 feet.

Hillsborough bay, lying westward of Barbados bay, is situated off the Hope estate; vessels may anchor in the eastern part of it in 6 fathoms; the wind generally blows along shore.

East of the west entrance point of Hillsborough bay is a bank with 21 feet on it, which breaks in strong sea breezes.

Minster rock.—This rock, with 6 feet on it, lies ESE. ½ E. distant 1 mile from Bacolet point and 3¼ miles WSW. from Smith island; it is composed of large bowlders and is steep-to; with the usual sea breeze it generally breaks.

Rockly bay.—Bacolet point forms the eastern entrance point of Rockly bay, which is comprised between the point and a projecting point situated 3½ miles SW. by W. ½ W. from it.

This is now one of the ports of call of the mail packet, for the convenience of which a red buoy is moored in 8 fathoms water, about midway between middle shoal and the town of Scarborough.

Light.—A pentagonal light-tower, 57 feet high, painted red and white, stands on Bacolet or Red point, and exhibits at 115 feet elevation a *fixed white* light, visible in clear weather from a distance of 12 miles, between the bearings ENE. ¼ E. and SW. by W.

Light-house ledge, with 12 feet near its south extreme, extends from Bacolet point SW. by W. for ¼ mile; from this ledge to the town of Scarborough, the depth of 5 fathoms is in no place more than 200 yards off shore.

Shoals.—There are several dangerous shoals in the middle and western parts of Rockly bay; of these the Bulldog, with 1¼ fathoms on it, lying SW. by W. distant about 2 miles from Bacolet point, is the outer; this is almost always breaking.

Several shoals, with 9 to 15 feet over them, lie WSW. ½ W. from Bacolet point distant 1 mile, and ESE. from the Red rocks (38 feet in height) in the western part of the bay; these shoals break with a fresh trade-wind, but not otherwise.

Middle shoal.—In the upper part of the bay, above the anchorage for very large vessels, there is a shoal of 10 feet, 400 yards long, WNW. and ESE.; the southern part of this shoal is ⅓ of a mile from the eastern shore and ½ mile off the western beach.

Scarborough, the principal town in Tobago, is situated on the NW. slope of Fort George hill, at the head of Rockly bay; it shows but very little when entering until a vessel arrives at the upper part of the bight.

Beacons.—Two beacons stand on the shore, close west of the Lower town of Scarborough, one on the beach and the other a little distance up

the hill; when in line bearing NNW. ¼ W. they lead from seaward towards the red buoy.

Lights.—From the top of each of these beacons a *red* light is exhibited on those nights when the mail steamer is expected.

Directions for Rockly bay.—When running along the south side of Tobago island, Little Tobago must be kept open of Pedro point, to avoid Great river shoal, and Richmond island must be kept open of Smith island to pass outside Minster rock. The light-house on Bacolet point in line with Fort George flagstaff, bearing NW. ½ W., leads ⅓ of a mile westward of Minster rock.

Bacolet point must not be approached until a tall chimney (Whim chimney), situated two-thirds up the slopes of the island, is brought open of the rocks off the eastern shore under Fairfield, bearing NW. ¼ N.; this mark leads southwest of Light-house ledge.

The leading mark through the middle of the clear ground, between Light-house ledge and the western shoals, is the SE. corner of the western large store on the beach (known by having a red roof and two large square windows) in line with Montpelier mill (apparently half up the slopes of the hills) and a notch between two hills very much alike on the top of the ridge bearing NNW. ½ W. This mark cannot be mistaken. Proceed in on this line until Fort George flagstaff bears NNE. when immediately alter course 1½ points to the westward, or for a cocoa-nut tree on the main ridge of the island at Amity Hope; this new course will lead fairly into the anchorage above Middle shoal, but for large vessels it is not advisable to proceed so far, but anchorage should be taken up in 14 to 16 fathoms, with Fort George bearing NNE. to NE.

Small vessels may anchor towards the head of the bay, with Church street in line.

These directions for entering Rockly bay are for vessels under steam by day; on ordinary occasions, with the usual breeze, a sailing vessel could follow the same track, but if not, with a wind inclining northerly, it will be necessary to be very careful when standing to the northwest not to bring Breeze Hall, a large house near the sea, open eastward of Orange Hill windmill, for very dangerous shoals of 9 to 14 feet lie immediately to leeward of this line; therefore tack on or before these objects are in line, and (avoiding Light-house ledge when standing back) keep towards the eastern shore until the anchorage is reached.

To avoid Middle shoal, when intending to anchor above it, the east shore must be kept near, taking care not to bring the Protestant church spire to bear east of NNE. until the vessels can fetch into the inner anchorage; recollecting also that off Fairfield a depth of 12 feet will be found at 200 yards from the shore.

Rockly bay, although a safe anchorage, is never very smooth, as the trade wind causes a continuous swell to set into the bay.

Steam vessels will find no difficulty in leaving the bay, but sailing

vessels will generally have the wind scant in casting. Be careful to avoid Middle shoal, and keep near the eastern shore until the vessel can weather all the shoals to leeward; in making the SW. board, being outside Middle shoal, tack where Breeze Hall house comes in line with Orange Hill windmill, as before. The morning is the best time for leaving, as the wind inclines northerly, and a vessel may clear in one stretch.

When farther out, in rounding Bulldog shoal, the two-storied house on the eastern shore should be kept open westward of French Hill (a green grassy hill seen over the eastern slope of Fort George) bearing N. by E. $\frac{3}{4}$ E.

Columbus point.—This point is low and projecting; it lies $\frac{4}{4}$ miles SW. by W. $\frac{1}{2}$ W. from Bacolet light-house, and is skirted by a reef close to the shore, with deep water outside, but between it and Crown or Brown's point, the SW. extreme of the island, shallow ground extends 1 mile off shore, approaching the coast to $\frac{1}{2}$ mile south of Crown point.

Drew bank.—This bank, lying off the SW. extreme of Tobago, is (within the depth of 10 fathoms) 5 miles long and $2\frac{1}{4}$ miles broad, and has a general depth of $4\frac{1}{2}$ to 8 fathoms over it; but there are two dangerous shoals on it, the Wasp at the north extreme, and the Drew, at 1 mile within its SW. extremity.

Wasp shoal, with 17 feet over the north end, lies SSW. $\frac{1}{2}$ W., distant 2 miles from Crown point; the passage between is deep, but must be navigated carefully, vessels of greater draught than 16 feet are not recommended to take this channel.

Pigeon point, a little open of Sandy point, leads over the Wasp shoal; no good mark for leading north of it can be given, but Columbus point bearing E. $\frac{3}{4}$ N. leads midway between it and the ledge off Crown point.

Columbus point, in line with Bacolet point light-house, bearing NE. by E. $\frac{1}{2}$ E., leads south of Wasp shoal, and Drew bank can be crossed on this line, hauling more westward when Pigeon point comes open of Sandy point.

Drew shoal of 21 feet lies SW. $\frac{1}{2}$ S., distant $5\frac{3}{4}$ miles from Crown point, and to large vessels passing between Tobago and Trinidad is a formidable danger. There are no good marks on Tobago to be recognized by a stranger for clearing the SW. edge of Drew bank, a plain direction being to keep midway between the islands, and when the NE. point of Trinidad (Galera point) bears SSE. a vessel may haul up, if proceeding northward. In fine weather, with a good look-out for change of color in the water and use of the lead, it may be skirted closer; there is generally a ripple at the edge, and when the sun is high, the white water is seen before reaching it; but as soon as 10 fathoms is obtained haul southward if the vessel draws over 18 feet.

Current.—Tobago being in a prominent position off the NE. coast of South America, is subjected, with Trinidad, to much of the force of the equatorial stream, and outpouring from the nearer large rivers; this current with a general motion to NNW. strikes Tobago on its south side, and dividing, one part rushes past the east end at a rate of 4 miles per hour, whilst the other part passes between those islands, and although slightly modified by the tidal stream, is generally running so strong to the NW. that vessels cannot work up against it; therefore vessels coming from the Atlantic to make Tobago should, when near, allow for a strong current to the NW.

This will ensure a good position for either proceeding to Scarborough or passing through. Vessels bound to Trinidad through the Dragon's mouth pass on either side of Tobago, but the clear sea to the northward seems preferable, if the distance is not materially increased.

Between Barbados and Tobago the stream is generally found running to the NW., with a velocity of 1 to 2 miles per hour, but sometimes this has not been experienced, a cessation for a short time occurring in this stream.

Tides.—The tidal streams about Tobago are very uncertain, being almost overcome by the current, the general effect being that the flood accelerates, whilst the ebb retards the stream to the NW.; the flood at the east extreme of the island presses the current close to the shore, whereas the ebb carries it off.

At the west extreme of the island the flood makes to the SE., close round Crown point and over the Wasp shoal for two hours, during its strength, just checking or throwing off the down stream, but this effect soon ceases. On the north side, at Courland bay, the flood sets slightly to the eastward, and the ebb in the reverse direction. At the Buccoo reef there is only a slight indraught into the lagoon on the flood; the ebb sets past it to the westward, and, combined with a slight current, sometimes attains a velocity of 1 mile per hour.

Working to windward on the coast of Tobago will be attended with difficulty except on the north side, inside the range of the current, and then, on arriving at the Melville islands, a vessel will require the wind northerly and strong to be able to cross it; should she, however, lie up SE. by E. she will soon make easting enough to keep away and run free against the stream if bound to Scarborough; in doing this beware of falling to leeward near Little Tobago.

Being at the west extreme of the island, and desirous of proceeding up the south side of Scarborough, a vessel should round Crown point as close as the ledge will allow, and if able to lie up SE. by E., continue on the port tack until east of the NE. extreme of Trinidad; here the current will be found setting north, and in this position short tacks must be made to windward, finally making one stretch across to the island of Tobago; but this cannot be done unless the wind is inclined to the north and the vessel sails very well.

A vessel can work to windward from Scarborough with a favorable breeze. Off Smith island the westerly current will be faint, and off Richmond island slightly favorable. Avoid Pedro point and the rocks south of Little Tobago, for the current sets very strongly in this vicinity, and with light winds renders a ship unmanageable.

It is high water round the coasts of Tobago island, full and change, at 3h. (approximately); springs rise 4 feet, and neaps 2 feet, but they are very irregular.

Winds.—At Tobago island the trade-winds do not blow very steadily, but are fitful and uncertain, and there is a large proportion of perfectly calm weather, more particularly in the hurricane months. Much rain falls, and short squalls are frequent. It has been said that Tobago is out of the path pursued by hurricanes, but this is not exactly true, for minor disturbances of that character have occurred both here and at Trinidad. It is certainly somewhat out of the direct line, but not altogether free from these visitations.

Ground swell.—The north side of this island is, in the winter months, subject to ground swells, generally setting in with light winds, strong trades apparently keeping them down; occasionally the ground swell becomes furious and very dangerous at the Buccoo reef and Drew bank. Vessels have in such cases to leave the northern bays, the holding ground becoming disturbed.

Trinidad.—This island contains about 2,012 square miles; its shores are so straight that it possesses no indentation that forms a harbor for large vessels; there are, however, several anchorages on the west side, which, from the absence of hurricanes and the regularity of the breezes, are always safe.

The north side of the island is marked by a ridge of densely wooded mountains about 8 or 10 miles in breadth, varying from 1,500 to 3,000 feet in height. The loftiest summits are the Cerro de las Cuevas, or Maraccas mountain, 15 miles from the west extreme of the island, and the Cerro de Aripo, 20 miles from the NE. extreme of Trinidad; both are 3,100 feet in elevation. To the southward of this range the interior is generally low and flat, with a few isolated hills from 700 to 1,100 feet high.

The south side of the island is also bordered by a range of mountains, but considerably inferior in height to those on the north side; near the middle of the east coast another small range extends to the WSW. nearly across the island. All the west coast of Trinidad is low, excepting mount Naparima, which is round and lofty. In clear weather it may be seen when 24 miles distant, and is a good mark when within the gulf of Paria.

The chief productions are sugar, molasses, rum, cocoa, and coffee, with a small quantity of cotton and indigo. In 1871 the total number of inhabitants was 109,638.

Rollers, similar to those met with at the Virgin islands and on the coast of Guiana, sometimes occur on the north side of Trinidad between the months of January and March.

North coast.—Galera point.—The north side of Trinidad from Galera point, the northeastern extreme of the island, to Entrada or Mono point, the northwest extreme, trends almost straight W. by S. 46 miles; and the whole coast is bounded by a rocky shore, upon which the surf breaks with such strength as to render landing impossible, except at a very few places and under favorable circumstances. The land in the vicinity of Galera point is not more than 50 feet high, but at about 3 miles to the westward it begins to rise into the great chain of mountains which extends along this side of the island.

At about half a mile eastward of the point there is a rock, often visible, but upon which the sea always breaks, and there is reason to suspect that other sunken dangers lie in the vicinity; in passing, keep fully 1 mile outside this rock, as the current sets down strongly upon it.

Toco bay.—The coast from Galera point trends W. by N. 1½ miles to Reefs point, and is skirted by a reef which extends ⅓ of a mile. To the westward of Reefs point the shore curves to the southward, and between it and Sans Souci point forms a bay about 4 miles wide, in which there is anchorage, but by no means to be recommended, as a heavy swell rolls in.

The best shelter is in the eastern part with Reefs point bearing E. ½ S. and Harris house, SSE.; or a little farther in with the point bearing E. ½ N., and the house on the same bearing as before, in 9 or 10 fathoms, about ¾ of a mile from the shore. Harris house stands on a little hill at the southeast part of the bay, and is the largest in the neighborhood. Close off Toco point, 1½ miles west of Reefs point, there are some small islets or rocks.

Coast.—Sans Souci point bears W. by N. about 2¾ miles from Toco point, and west 4¼ miles from Reefs point. From thence the shore, which generally rises steeply from the sea, trends about W. ¾ S. 2¼ miles to the east entrance point of Grande Rivière bay, off which there is an islet or rock.

Grande Rivière bay.—At about a mile SW. by S., from the east entrance point of Grande Rivière bay, is the Grande Rivière, which, however, is only admissible to boats. From the entrance of the river a sandy beach extends to the westward about ½ mile, and off its west extreme are two rocky islets, the outermost lying about ⅓ of a mile from the shore. From thence to Grand Matelot point the shore is rocky and high, with a few sandy beaches trending W. by S. for 5 miles.

Anchorage.—A vessel will find temporary anchorage in 9 fathoms, with the eastern entrance point bearing E., and the east extreme of

the sandy beach at the entrance of the river S. by E. Coasters find secure anchorage nearer in on the east side; there is generally a heavy surf on the beach.

Les Frères rocks.—These rocks are situated about 2 miles westward of Grande Rivière bay; they extend off shore ⅓ of a mile; inside of them is Sharks river, only fit for boats.

Grand Matelot bank, with 9 to 10 fathoms over it, lies NNW. of Grand Matelot point distant 2 miles; anchorage may be taken on it, but the sea is very confused.

Madamas river is situated 3½ miles WSW. from Grand Matelot point. At about 1¼ miles to the westward of the entrance is Trou Bouillé Ris point, and at 2 miles farther on, in the same direction, is situated Paria point, islet, and rivulet; the shore between being chiefly rocky cliffs, with two islets lying near it.

Blanchisseuse bay, which lies 3 miles westward of Paria point, has a rock which uncovers, lying ⅓ of a mile off its eastern entrance point; this is the most outlying danger on this part of the coast.

Macapou and Yarra rivers.—The Macapou enters the sea about 3 miles westward of the Paria. The Yarra is about 3 miles westward of the Macapou, but neither of them are of any importance, and fit only for boats. Between the mouths of these rivers the shore is partly composed of cliffs, and WNW. from the Yarra it is sandy for about ¾ of a mile.

Chupara point.—This point lies 28 miles to the westward of Galera point, and has a sea face of ¾ of a mile. It is steep and cliffy, and forms the most prominent headland on the north coast. From its eastern part a reef (Chupara rocks) extends NE. ½ mile and from the western extreme a reef extends WSW. ⅓ of a mile, and generally breaks.

Anchorage may be obtained anywhere between Chupara point and Grand Matelot point, in 10 to 12 fathoms, mud; there is also anchorage in Chupara bay west of Chupara point, sheltered by that point, but it is not recommended.

Las Cuevas bay.—From the west extreme of Chupara point the shore trends southwest for 2 miles to Abercrombie point, at the eastern limit of Las Cuevas bay. Anchorage may be taken in this bay with Abercrombie point bearing ENE. distant ⅓ of a mile, but it is much exposed to a swell from the northward.

Maracas bay, lying SW. distant 2 miles from Las Cuevas bay, is a mile wide and about the same in depth, with 16 fathoms, mud, at its entrance, gradually decreasing to 8 and 7 fathoms over sand near the middle. Although open to the north, it affords better shelter than any other anchorage on this shore; but being under high land the winds experienced are very variable.

Supplies.—Water, wood, and fish can be obtained in this bay.

La Vache bay lies 3 miles westward of Maracas bay, with Balata bay situated between. Neither is so good for anchorage as Maracas bay, both being deep. Off the east entrance point of La Vache bay is an islet of the same name, 180 feet high.

Mal d'Estomac bay, situated immediately west of La Vache bay, is not fit for anchorage.

Chute d' Eau cove, about 2 miles westward of La Vache bay, takes its name from a remarkable cascade, which falls over the rocks from a considerable height. Off it is Saut d'Eau island, a small woody islet 370 feet high, steep-to, with a boat channel between it and the main, a quarter of a mile wide. On the sandy shore of Chute d'Eau cove there are a few fishermen's huts. Neither this nor La Vache bay affords safe anchorage, on account of the heavy swell which rolls into them, and the uncertain winds from the high lands. South of Saut d'Eau islet, mount Mal d'Estomac rises abruptly from the shore to the height of 2,230 feet.

Coast.—At about 3 miles westward of Saut d'Eau island there is a signal staff on a hill 740 feet high, known as North post, which communicates with Port of Spain, and at about 3 miles more to the westward is Corozal point; the whole shore is bold and rocky, without any shelter whatever.

From Corozal point the shore trends SW. by W. about 4 miles to Entrada or Mono point, the northwestern extremity of Trinidad.

Macaripe cove, which is situated a mile southwest of Corozal point, affords shelter for coasters in 7 to 3½ fathoms water. At a distance of 30 yards to the northward of the northeast point is a sunken rock. In the southwest part of the cove are two sunken rocks at about 30 yards from the shore, and on which the sea breaks when there is any swell.

Great caution is required by large vessels anchoring here; the 14-fathom line of soundings is barely 200 yards outside the line joining the northeast and southwest points of the bay.

Steer in with the northeast point of the bay bearing SE. by E., and anchor as soon as the depth of 15 fathoms is obtained. A sailing vessel should anchor at least ⅛ of a mile off shore in 25 or 30 fathoms.

At change of tide a bore rushes round the cove swinging the ship violently round her anchors. Altogether Macaripe cove is a most unsafe anchorage.

On arriving off Macaripe cove with light winds, a vessel will find good anchorage, with a kedge or stream, in 23 fathoms, at 2 miles off shore, on the soft muddy bank extending from the north coast.

The shore ends of two telegraph cables are laid in Macaripe cove.

Water.—At all the anchorages on this shore water may be obtained, but only under very favorable circumstances, on account of the heavy

surf which makes landing difficult, more particularly in the months of January and February when rollers prevail.

Tides.—It is high water, full and change, at Grande Rivière at 4h. 30m. Between Grande Rivière and Chupara point the last two hours of the ebb, and sometimes the whole of it, sets to the eastward along the shore. To the eastward of Grande Rivière the tidal stream is overcome by the current running to the westward between Trinidad and Tobago. To the westward of Chupara the ebb runs always to the eastward, increasing in strength, and diverging to the NE. and N. as Mono point is approached. Off the Bocas de Dragos the ebb runs to the N. and NW. with a velocity of 2 to 3 knots an hour according to the season and the state of the Orinoco; in the months between July and October its influence is felt at 15 or 20 miles from the land. The flood sets to the westward, decreasing its velocity as it approaches Mono point, and increasing as it recedes from the shore.

Bocas de Dragos.—Mono or Entrada point is 10½ miles eastward of Peñas point, the easternmost extremity of Paria. The space between is divided by three islands (extending half way across from Mono point) into four navigable channels leading into the gulf of Paria, termed by Columbus the Bocas de Dragos, from the opposition he met with from the currents and baffling winds in getting into them.

Mono or Ape island, the easternmost of these islands, 1,000 feet in elevation, is about 2 miles long NE. and SW. and 1½ miles broad. It has a ridge along its western side which sends off singularly sharp spurs to the various points on the SE. side, and on the NW. side terminates in bold cliffs from 700 to 800 feet high. The few inhabitants on it have to depend upon rain for a supply of water.

At 200 yards ENE. from the northeast extreme of the island there is a cluster of rocks known as the Puercos, the largest of which is 70 feet high, with shallow ground between them and Mono island. Anchorage for small craft will be found in Dehert bay, on the southeast side of the island. From the eastern entrance point of Pierre or Coxall bay a ledge of 8 feet water extends to the southward about 200 yards.

Boca Mono.—This channel lies between Mono island and Trinidad, and is from ¼ to ½ mile wide, with a depth of 25 to 45 fathoms, muddy bottom; the eddies experienced off the points are so strong and irregular, and the wind so baffling under the high land of Trinidad—although a fine steady breeze may be blowing outside—that it is by no means adapted for a sailing vessel. Steam vessels have only to keep in mid-channel. A small rock, which uncovers 3 feet at low water, lies close off Taitron point, on the east side of the southern entrance, and there is a small ledge close off the opposite point on Mono island; but they can scarcely be termed dangers.

Huevos or Egg island.—This island, the center and smallest of the group, is uninhabited, and lies about ¾ of a mile westward of the nearest part of Mono island. It is of a semicircular form, convex to the northeast, about 1½ miles in length, but very narrow, and near the middle it is almost divided into two parts, connected by a small neck of sand, which uncovers at low water. The northeast extreme, which is the most elevated part, is 680 feet high, and close off it there is a small islet 90 feet high, steep-to, known as the Quitasol or Umbrella rock. Although a deep bay is formed on the west side of Huevos island quite free of danger, it does not afford safe anchorage.

Boca de Huevos.—This channel, more generally known as the Umbrella channel, is about ¾ of a mile wide, and being open to the NE. and SW., is usually taken by vessels entering the gulf of Paria. It requires, however, a commanding breeze to the northward of east to enable a vessel to stem the current; when running in, Huevos island should be kept near to avoid the eddies and baffling winds under Mono island. With the wind to the southward of east it should not be attempted.

Chacachacare, the westernmost island in the Bocas de Dragos, is irregularly shaped, and like Huevos island, the northern part is nearly separated from the southern, being only connected by a small low neck of sand. The two parts form a large bight on the eastern side named Chacachacare harbor, open to the southeast, about a mile deep and half a mile wide, entirely free from danger, and which affords excellent anchorage for large vessels in 15 to 25 fathoms.

To enter this bight, keep near Romain point, the southeastern extremity of the island, until within the line of the entrance points, as the current sets strong to the NE. across the entrance.

About 100 inhabitants, who cultivate vegetables, and fish for whales, are scattered on the shores around the bay. There are no springs on the island, but rain-water is caught in tanks.

Gimè point, the eastern extreme of Chacachacare island, bears WSW. ⅔ of a mile from the south extreme of Huevos island, and from thence the shore trends to the northwest 1¾ miles to La Lue point, the north extreme. The land rises abruptly from the sea to the height of from 600 feet to 830 feet at the latter point, which is composed of remarkable red cliffs. From La Lue point the coast trends WSW. for ½ mile to Cabres point, and about midway, at 200 yards from the shore, there is a small rocky islet named Cabrez islet, 135 feet high and steep, to.

From Cabres point to the southwest extreme of the island the coast trends about S. by W. for 1½ miles, but near the middle there is a small cove, west of the narrow low neck of sand that connects the two portions of the island; the cove, which is named La Tinta bay, is skirted by rocks to the distance of 200 yards from the shore, and close off the south extreme of the sandy beach, under the Alum cliffs, there is a small black rock.

The southwest extreme of the island is terminated by a bold perpendicular cliff 430 feet high, facing the west, and gradually sloping down to the southward to the sea. Close to it are two remarkable small rocky islets lying about 200 yards north and south of each other; the northernmost is known as La Fragua, and at 200 yards to the westward of it there is a rock with 13 feet water.

The south side of the island trends easterly for 1½ miles to Romain point, with a curve to the northward, and is clear of danger, but affords no safe anchorage.

Diamante or Diamond rock.—This dangerous rock is about 100 yards in extent and is composed of large blocks of coral, upon which there is only 9 feet at low water. The rock is steep-to, and between it and the southwest extreme of Chacachacare island there are 12 fathoms water; this channel is only 400 yards wide, and by no means safe on account of the violent tide eddies and baffling winds.

Clearing marks.—Cabres islet, open north of Cabres point, bearing NE. ½ N., leads west of Diamond rock; and Romain point, open south of the rocks extending from the southwest extreme of Chacachacare island bearing E. by N., leads south of that danger.

Bell buoy.—An iron bell-buoy painted red is moored in 9 fathoms water, about 50 yards SW. by W. of the shoalest part of Diamond rock, with the northwest point of Chacachacare island bearing NNE.; the summit of the small conical islet in the southwest part of La Tinta bay, seen between the two largest houses on the cliff of the bay bearing NE.; and all the southern points of Chacachacare island shut in with the southwest rock bearing E. ½ N. nearly.

Boca de Navios.—This channel, between Huevos and Chacachacare islands, generally termed the Ship channel, is about ⅔ of a mile wide, and has no danger in it, being in some places upwards of 100 fathoms deep; but as the wind will seldom allow a vessel to lay up so high as SE. the course through it is not a safe entrance to the gulf. It may, however, be freely navigated from the southward, with a steady commanding breeze, and under the circumstances, it is far safer than the Umbrella channel; but if the wind be light and variable it will be more prudent to run through the Boca Grande, for there is no safe anchorage, and the current sets strongly towards Chacachacare island.

Boca Grande.—This channel, as the name implies, is the largest of the channels leading into the gulf of Paria, and by far the safest to navigate, particularly in the summer months, when the tidal streams are most violent and irregular, and the winds light and variable. Between the northwest point of Chacachacare island and Peñas point, the eastern extremity of Paria, the channel is 5½ miles wide. Off Peñas point there is a small rock awash, at ¼ of a mile from the shore, but as it breaks, may be easily avoided.

Goose or Pato island, which belongs to the British, is a mile long east and west, ⅛ of a mile broad, and 350 feet high. Its east extreme lies S. ¼ W., 5½ miles from Peñas point, and its west extreme is 2⅓ miles from the mainland of Paria; it is steep-to on all sides; the only danger, therefore, in this channel is the Diamond rock.

Tides.—As well as a regular ebb and flow of the tide through the Bocas de Dragos, there is a constant current setting out of them from the gulf of Paria, which, during the months of July, August, September, and October, attains its maximum velocity; this accelerates the ebb and checks the flood. During these months the tidal streams in the Bocas, during springs, run at the following rates:

It is high water, full and change, in the Boca Mono at 3h. 50m. During the flood there is no stream whatever; the ebb combines with the current and runs through to the northward from 2 to 3 knots an hour.

In the Boca de Huevos the flood seldom overpowers the current, and the ebb stream combined with the current runs at the rate of 3 to 4 knots, and even 5 knots an hour in the rainy season.

In the Boca de Navios the flood seldom exceeds a knot an hour; the ebb and current combined runs from 2½ to 3½ knots. In this channel and in the Boca de Huevos the flood is sensibly felt under the east sides of the islands.

It is high water, full and change, in the Boca Grande at 3h. 30m.; springs rise 4 feet, neaps 2½ feet, and this is the average range at all the Bocas, and along the west side of Trinidad. The highest tides are in October, the lowest in April and May. During the summer months, from July to October, the flood runs through this Boca during springs, for about 4 hours, but seldom exceeds half a knot; the ebb runs eight hours at the rate of 2 to 3 knots. During neaps, and in the dry season, from about November to June, the tidal streams are reduced to about 1 knot, but they are continually interrupted by local causes, and the state of the rivers which flow into the gulf of Paria.

Inside the Bocas the flood stream sets to the eastward along the Trinidad shore, running strongly through Chaguaramas bay, and among the Diego and Five islands, to Port of Spain, when it turns to the southward in the direction of the coast. At Chaguaramas it forces its way in at about two-thirds ebb by the shore, very suddenly, like a bore, checking the ebb, and, after a short time, subsiding into a steady rate. From a commanding position the contending streams may be seen producing a strong ripple, extending in long curved lines for several miles outside the Bocas, gradually approaching them as the flood makes. In the Bocas the ripple frequently becomes a violent race, and very dangerous to small boats. The ebb between Port of Spain and the Bocas is usually about twice the velocity of the flood. In the offing to the southward of Gaspar Grande island, both streams run regularly 6 hours each way, and the rise and fall on the shore follows the general law.

The water in the gulf of Paria, and for several miles outside the Bocas, has a dirty hue; in the month of October it has a reddish tinge.

Directions for the Boca Grande.—If entering the gulf of Paria by the Boca Grande, keep near the island of Chacachacare, taking care, however, not to come within the influence of the baffling winds under the high land. If a vessel has to work in, the Paria shore should be given a wide berth, as the current sets strongly towards it, and there is no safe anchorage. The only danger to be avoided is the Diamond rock, which will be cleared when approaching the southwest extreme of Chacachacare island, by keeping Cabres island open of Cabres point bearing NE. ½ N., until Romain point comes open of the rocks off the southwest extreme of Chacachacare island bearing E. by N., when a course may be shaped to the eastward for Port of Spain.

The navigation from the Bocas to Port of Spain is so simple that it is only necessary to take advantage of the winds in working up, and to observe that the farther a vessel is to the southward of the Bocas the less will be the current experienced. Should it be found necessary to stand far southward, the soundings will be found not quite regular, there being some small banks with 6 or 7 fathoms on them, at 15 or 20 miles from the land. The shoals off Naparima must be carefully avoided, and the shore to the northward of this should not be approached nearer than 4 miles, as shallow ground extends nearly that distance from it.

Vessels from Port of Spain, running out through the Boca Grande, with light winds, must be careful to keep Chacachacare island at least 1½ miles distant, and the Boca Huevos well open until Cabres island is seen to the westward of Cabres point, when a more northerly course may be pursued. Having shut Romain point in with the southwest extreme of Chacachacare island, the Diamond rock will have been passed and a fairway course may be shaped, taking great care, however, to keep well to the eastward of the Paria shore.

Anchorage.—About 7 or 8 miles to the southward of Chacachacare island the depths decrease to 16 and 12 fathoms, olive colored mud, and the soundings will be carried to the Diego islands, affording good anchorage. From thence to Port of Spain the bank becomes gradually shallower, and should it be necessary to anchor in the offing the kedge will be sufficient, indeed more convenient, for the ground is so tenacious that there is often great difficulty in weighing a bower anchor.

Carenage de Mono.—From Mono or Entrada point, the northwestern extreme of Trinidad, the shore trends about S. by E. for ¾ of a mile to the entrance of a small inlet named the Carenage de Mono, known also as Scotland bay, and the ridge of hills which rises above it is 780 feet high. The inlet is about ½ mile wide, at the outer part, and runs in to the northeast about the same distance. At the entrance there is a depth of 17 fathoms, which decreases to 6 and 5 fathoms at the inner part,

where a vessel of large draught might be secured to the shore in safety. Off the sandy beach on the east side there is a bank which shoals suddenly, therefore, in beating up, the northern shore, which is steep-to, must be kept aboard.

Scotland bay affords useful anchorage for steam-vessels in cases of necessity.

Taitron bay.—At about ½ mile southward of the Carenage de Mono is situated the Taitron point, and between them is a deeply curved sandy bay (Taitron bay), with 15 fathoms at its entrance, decreasing to 8 fathoms within 200 yards of the beach. At about 100 yards from Taitron point there is a small rock which uncovers 3 feet at low water. The land at the back of this bay rises to the height of 1,500 feet.

Gaspar Grande island.—Espolon point, the west extreme of this island, bears S., distant 1 mile from Taitron point, and is steep-to. The island is about 1¼ miles long east and west, ½ mile broad, and 360 feet high. There are a few inhabitants on its south side, scattered along the shore of a deep cove, known as Corsair bay, which forms a good boat harbor, but the place is considered unhealthy. On Espolon point there is a small whaling establishment. Scorpion ledge, 10 feet of water, extends 250 yards from the southeast extreme of the island, and from its outer part Reyna point, the northeast extreme of the island, bears N. by E.

Supplies.—Water, fresh meats, and vegetables may be procured at Corsair bay; firewood may be cut, but it will be necessary to obtain permission of the proprietor, who resides at Port of Spain.

Gasparillo island.—From Taitron point to San José point the shore trends E. by S. for ¾ of a mile. Off the latter point lies Gasparillo island, 120 feet high, which has a small rock off its north side, leaving a channel between the rock and San José point 250 yards wide, with 6 fathoms water in it. The island lies ¼ of a mile from Gaspar Grande island; the channel between them is quite clear, with depths of 20 to 24 fathoms.

Chaguaramas bay.—From San José point the coast trends to the NE. and E. for 1¼ miles, and then to the SSW. for about ¾ of a mile, to San Carlos point, forming a bight known as Chaguaramas bay, which, being sheltered by Gaspar Grande island to the SW., makes an excellent anchorage in every part. The only obstruction is a flat sand bank of 6 feet water, very steep-to, which extends about ¼ of a mile from the north side of the bight between San José point and the narrow neck of land which separates the bay from the Carenage on the east side of the peninsula. This will be avoided by keeping Taitron point open of San José point. The channel between San Carlos point and the northeast extreme of Gaspar Grande island is ½ mile wide, and the only danger in it is the Scorpion ledge at the southeast extreme of Gaspar Grande island.

Canal.—A canal for boats, called *Hart's cut*, has been cut across the Chaguaramas peninsula to afford safe passage in stormy weather. Boats of ordinary draught can use this cut after half tide.

Water may be obtained in Chaguaramas bay, and the most convenient anchorage for this purpose will be found in 13 fathoms with the east extreme of Gaspar Grande island bearing S., and Taitron point a little open of San José point.

Tides.—It is high water, full and change, in Chaguaramas bay at 4h. 20m.; springs rise about 4 feet. The flood runs strongly through to the eastward for 8 hours, commencing to run at about two-thirds ebb by the shore; this long-continued flood tide will be found very advantageous to small vessels working up to Port of Spain.

Directions for Chaguaramas bay.—Steam vessels may enter Chaguaramas bay from the northward by the Boca Mono and the channel between Gasparillo and Gaspar Grande islands; and all that is necessary is to steer in mid-channel. Sailing vessels should enter by the eastern channel, between Gaspar Grande island and the Chaguaramas peninsula, and the only precaution necessary is not to bring Reyna point, the northeast extreme of Gaspar Grande island, to bear eastward of north, to avoid Scorpion ledge off the southeast point of that island, which has only 10 feet on it. It will be better to enter this channel on the flood with a good breeze, which will not only place a vessel more under command, but lessen the risk of drifting upon Gaspar Grande island, should it fall light under the peninsula of Chaguaramas, which is 480 feet high. As the wind generally blows out, it will be better to leave the bay by the western channel.

Escondida bay, a little cove a short distance to the northward of San Carlos point, affords anchorage for small coasters.

From thence the shore trends SE., for $\frac{1}{3}$ of a mile, to Gourde point, and then takes an ENE. direction, for $1\frac{1}{4}$ miles, to the extremity of the peninsula.

Carenage.—On the northeast side of Chaguaramas peninsula there is a small inlet or bay, with 4 fathoms to 10 feet water in it, which makes an excellent harbor, where vessels of light draught can effect repairs. A short distance to the northeast of it there is another small bay with $1\frac{1}{2}$ to 4 fathoms water.

Diego islands consist of two small islands lying NE. by E. and SW. by W. of one another; each island is about a quarter of a mile in extent and 200 feet high, and they are separated by a channel $\frac{1}{4}$ of a mile wide, having near the middle a shoal of 11 feet, with 5 fathoms between it and the eastern island. These islands are steep-to, and lie about $\frac{1}{3}$ of a mile from Chaguaramas peninsula; in the passage between there are 15 to 21 fathoms water, except a shoal with 17 feet which lies about midway between them.

Five islands, or Cotorras.—These islands form a cluster of five small islands, occupying a space ½ mile long and ⅓ of a mile broad; the largest, situated at the northeast part of the group, is 115 feet high. The western islet lies E. ½ S. 1¼ miles from the easternmost Diego island. They are steep-to within 200 yards, and the channel inside is free from danger; but as the tidal streams are strong in this vicinity, it is better to pass outside both groups.

Cocorite.—From the Carenage the coast takes a general ESE. direction for 6 miles to the city of Port of Spain. On the shore between is situated the small village of Cocorite, where there is a wharf conveniently situated for landing military stores for St. James barrack. The 3-fathom line of soundings comes within ½ mile of the shore.

Port of Spain.—The city of Port of Spain is the seat of government and capital of Trinidad, and contains a population of about 30,000 inhabitants. It is situated on the shore at the south extreme of a low flat plain at the base of St. Anne mountains, which rise to the height of 2,140 feet, at 3 miles northeast from the city; at half a mile to the eastward it is overlooked by the Lavantille hills, or Abercrombie heights, a fork from the northern mountains; and on the summit of a small hill, 410 feet above the sea, may be seen the ruins of St. David's tower, but it is not a prominent object. The city is regularly built, with wide streets, and it has some fine buildings, amongst which are the custom-house, market, and numerous churches. About 3 miles to the northwest is situated Fort George, with a signal post 1,120 feet above the sea, which communicates with the city and a post on the north side of the island before mentioned. The valley is drained on the east side of the city by St. Anne river, and on the west by the Maraval, but they are mere mountain streams.

Caroni river enters the sea at 1½ miles to the southward of the lighthouse. On the bar of this river there are 6 inches water, but it deepens within, and runs up a considerable distance; it is not, however, navigated. Blue river, about a mile farther to the southward, has a depth of 1 foot on the bar at low water.

The wharves at the town have not sufficient depth alongside for loading vessels, which take in their cargoes from large lighters. Hulks are moored in the offing for the convenience of heaving down; and steam machinery can be efficiently repaired.

Lights.—A *fixed white* light is exhibited from an hexagonal-shaped tower 43 feet high, erected on the end of a jetty close to the small Water battery at the south end of the city. The light is elevated 50 feet above the mean level of the sea, and in clear weather may be seen from a distance of 10 miles between the bearings NE. ¾ N. and SE. ⅓ S. When within a distance of 2 miles this light is only distinguished from the surrounding lamps by its greater elevation.

From the hulk *Ripon*, moored in the anchorage, is exhibited a *fixed red* light, elevated 50 feet above the sea, visible in clear weather from a distance of about 3 miles. This light is shown to assist vessels in taking up an anchorage.

Buoy.—A white buoy lies in 18 feet, W. ½ S. from the entrance of the Caroni; inside a depth of 3 fathoms, the water shallows suddenly. From the buoy the light-house bears NNE. ½ E., distant 2 miles.

Quarantine buoys.—Off Maraval point, just west of the city, are two *red* buoys, marking the quarantine anchorage. Vessels arriving with any disease on board are required to anchor near these buoys, and the sick are taken to the lazaretto.

Leading marks.—A Roman Catholic chapel, with a square *white* tower, stands on the ridge to the eastward of the town, and to the northward of St. David's tower, which, kept a little open to the southward of the square stone tower of the police barracks in the town, will lead into the anchorage.

Supplies.—Provisions are plentiful and can be purchased at an advance of from 20 to 25 per cent. on New York prices.

Water is plentiful and good and can be obtained from a pipe at the inner extreme of the pier, or at the light-house wharf; to ships in the bay the charge is 1 cent per gallon.

Coal.—Facilities for coaling are good. Coal can be taken on board either from lighters or by going alongside the coal hulk, if the vessel draws less than 20 feet of water. For men-of-war coaling by the lighters is preferable. The average price of coal is $8 per ton delivered on board.

Anchorage can be taken up anywhere off the town; the bottom is of soft mud, and a vessel need not fear touching the ground; but be careful not to ground on the anchors, which is likely to happen at night when it is calm; vessels should be steadied with a kedge laid out to the westward. The increase of depth from the shore is very gradual, and a depth of 2 feet under the keel at low water will be enough.

Directions for Port of Spain.—Vessels bound to Port of Spain in the dry season between November and June, when the trade-wind is to the northward of East, should navigate the north side of Trinidad, and enter the gulf of Paria by either of the Bocas. In the remaining portion of the year, when light winds to the southward of East and heavy rains prevail, which increase the velocity of the current, it will be more advantageous to navigate by the south and through the Serpent's mouth. Sailing vessels should always leave the gulf by the Bocas.

In either case vessels from the eastward should lose no opportunity by night or day of determining their position, in order to detect the effects of the current; more especially in the rainy season, when its

strength and direction, as the island is approached, are extremely variable, and soundings should be sought, the 100-fathom edge of the bank being from 50 to 70 miles eastward of Trinidad.

At about 20 miles eastward of Galera point there is a depth of 43 fathoms, gray sand and shells, and the depth decreases to 30 fathoms, stiff dark clay, within 6 miles of the shore. It is observable that the bottom all along the north shore of Trinidad is of soft mud, and on the east side of the island it is generally composed of gravel and coarse sand.

It will always be prudent to keep well to the southward of the intended landfall, for it will at all times be extremely difficult to work back to the southeast against wind and current. The northern and easternmost mountains of Trinidad may be seen from a distance of 30 or 35 miles; but Galera point is only made out at about 9 miles. As already stated, the north shore of the island is bold-to, and should be skirted at the distance of about 2 miles. On arriving off Macaripe cove, should the wind fall light or draw to the southward, so that the current in the Bocas could not be stemmed, it will be better to bring up with the kedge in 20 or 30 fathoms, at about a mile from the land, and wait for the breeze. If, on the other hand, this point should only be reached just before dark, and a fresh breeze prevail, especially in the season of the rollers, it will be better to stand off and on all night under commanding sail to windward of Saut d'Eau island, and wait for the full strength of the breeze on the following day, which generally sets in about noon.

Sailing vessels should not attempt to run through either of the Bocas after sunset, as the wind then generally falls light and becomes variable. Steam vessels, however, may pass through either of the channels at any period by observing common precautions.

With a steady 5-knot breeze, the Boca de Huevos, or Umbrella channel, may be taken without fear, and something will be gained to windward on entering the gulf; but should the wind be light, or to the southward of East, much time will be saved and far less risk incurred by taking the Boca Grande. Frequent accidents occur in the Umbrella channel by vessels attempting to run through with a light wind; they become unmanageable under Mono island, and the current either sweeps them out again or drifts them near the rocks off Huevos island, for there is no anchorage.

When about 5 miles within the Boca Grande the spires of the two principal churches in the city of Port of Spain will be in sight, and serve for guides in working up.

Tides.—It is high water, full and change, at Port of Spain at 4h. 30 m.; springs rise 4 feet, neaps 2½ feet. The flood sweeps round the bay to the southeast at the rate of about ½ knot an hour, and the ebb with the same velocity to the northwest.

Winds.—Under the west side of Trinidad, in the dry season, from November to June, when fine settled weather prevails, the sea breeze sets in about 9 a. m., varying from E. to ENE., inclining more to the northward in January and February, and continues steady until 5 p. m., when it subsides into a calm or light air till the following morning. In the summer months, although hurricanes rarely reach thus far, violent squalls rush down veering from SE., through south to W., and in October they occur almost daily with heavy rain. There is seldom, however, at this period any fall of rain during the night, but a heavy shower without wind generally comes down about half an hour before sunrise.

Delaware bank.—At the assumed position of this bank (lat. 10° 42′ N., long. 60° 5′ W.), there is no bottom at 100 fathoms, and soundings in the vicinity give no indication of shoal water—northwest of that position, however, at the distance of about 19 miles, in lat. 10° 50′ 20″ N., long. 60° 20′ 50″ W., is a bank composed of sand and coral, about 1½ miles in extent, on which the least depth is 13 fathoms with 17 to 40 fathoms around, and 40 to 50 fathoms in a SSE. direction at the distance of about 10 miles.

Darien rock.—When approaching Darien rock from the northwest, broken water will be observed at a distance of 2 to 3 miles; there is anchorage in 13½ fathoms, coral, with the rock bearing NE. distant about ½ mile; hill over Galera point (830 feet) NW. ½ W.; L'Ebranche hill W. ¼ S.; and Trinity hill SW. ½ W.

These bearings place Manzanilla point on a west bearing, distant 23¾ miles.

The rock is nearly flat, and uncovers between the breaking seas, and extends in a NNE. direction about 40 yards, with a breadth of 25 yards. At the distance of about 20 yards around the rock the least water is 4 fathoms, sand, deepening to 10 fathoms at about 800 yards; and at a distance of from ½ to 1 mile around are depths of 15 to 24 fathoms, over sand and coral.

There is ordinarily a confused sea for ¼ of a mile round the rock, and a remarkable rip extends for about 1½ miles to the NNE., giving the vicinity the appearance of shoal water. The current sets NNW. about 1.8 miles per hour.

East coast of Trinidad.—From Galera point to Galeota point (the southeastern extremity) the coast trends about S. ½ W. for 42 miles, and may almost be termed unapproachable; it is formed chiefly of one rocky and three long sandy beaches, each about 12 miles in length, on which the surf breaks heavily, at all times rendering landing nearly impracticable. These beaches are separated from each other by irregular points of moderately elevated land.

Forest point.—Off this point, lying 1 mile S. by W. from Galera point, the rocks extend ¼ of a mile, and break heavily.

Guayama point lies 3½ miles SW. by S. of Forest point, and between them is Cumana bay, the only place where a landing could be effected, the shore being broken with sandy beaches. Some plantations exist near Cumana bay, and a village of Carib Indians.

From Guayama point the shore trends SW. by S. for 3½ miles to Balandra point, and is composed of cliffs until within ¾ of a mile of the latter point, when it becomes sandy, and terminates close to the point in a steep rock.

Balandra bay.—This bay, immediately to the southwest of Balandra point, is a mile wide, and affords shelter under the north shore for small coasters in 4 to 2½ fathoms. This part of the coast is a sandy beach, and near the west end of it a rivulet reaches the sea.

From Balandra bay to Salibia point, ¾ of a mile to the westward, the shore is rocky.

Salibia bay lies between Salibia and Matura points; the eastern part is rocky, the western sandy, and at the head, two streams flow into the sea. Near Salibia point there is a rocky islet; landing may be effected westward of the rivers.

Anchorage.—NW. of the islet off Salibia point there is shelter for small craft drawing 8 feet water, and to the southward there is exposed anchorage in 5 or 6 fathoms, as also in greater depths farther eastward.

Matura point.—The rocky shore and the base of the northern range of mountains terminate at Matura point. From thence to the southward the shore is sandy; the interior is level, of moderate height, and densely wooded, with a few distant isolated hills rising out of the plain.

Matura bay.—From Matura point this sandy shore, nearly straight, trends in a S. by E. direction for 10 miles to Manzanilla point, upon which the surf breaks with such violence as to render landing on any part of it totally impracticable. The river Oropuche enters the sea through the surf over a bad bar about midway between the two points. Some seams of coal have been found in this bay, and it is entirely planted with cocoanut trees.

Manzanilla bay.—From Manzanilla point the shore trends WSW. for 2 miles, and is for the most part rocky; but there is a little sandy bay to the westward of the point, in which there is shelter for small craft drawing 9 feet water; and, being protected by some rocky islets near its east entrance point, it is the best anchorage on this side of the island. A reef of rocks extends from Manzanilla point to the eastward nearly a mile, and breaks heavily.

L'Ebranche rocks.—At 2 miles SE. from Manzanilla point is a cluster of three small rocks which uncover 4 feet, over which the sea always breaks; and W. by S. distant ½ mile from them there is another rock

awash, but so small that it scarcely makes a breaker, and is not seen until close to. Foul ground extends to the ENE. from the three rocks nearly ½ mile; the sea breaks over and about it in very bad weather, and near it the soundings shoal suddenly from 10 to 5 fathoms.

Anchorage.—With the entrance of L'Ebranche river bearing NW., and Manzanilla point NNE., there is good anchorage in 5 fathoms; and this is by far the best temporary anchorage on the coast, for a vessel will have sufficient room to get under way in case of necessity. Vessels coming from the northward may run with safety between Manzanilla point reef and L'Ebranche rocks; but the prevailing wind will scarcely permit a square-rigged vessel to stand through this channel from the southward.

Anchorage may also be taken up at a mile SW. of L'Ebranche rocks in 7 fathoms.

Cerros de Manzanilla.—From Manzanilla point a ridge of hills crosses the island in a WSW. direction to Pierre point, on the western side; on the eastern part of this ridge mount Harris, 960 feet high, and mount Tamana, of 1,120 feet elevation, are prominent objects.

L'Ebranche river.—Close to the westward of the cliffs on the west side of Manzanilla bay is the mouth of a little stream known as L'Ebranche.

Cocoa bay.—This bay, situated between Manzanilla and Mayaro points, has a low sandy shore 11 miles long, planted with cocoanut trees. The rivers L'Ebranche, Doubloon, Nariva, and Ortoire, or Guatuaro, flow into this bay, the latter at its south part. There are heavy rollers all along this beach for more than half a mile off shore, and landing is almost impossible.

Guatuaro or Mayaro point.—This prominent headland, which may be seen from a distance of 18 miles, lies S. by E. distant 11 miles from Manzanilla point, and 1½ eastward of Ortoire river. It is a remarkably bold, flat-topped promontory, about a mile across; the east side presents a face of high cliffs, and from its northeast extreme a reef extends ⅔ of a mile. This point should not be passed within a distance of 2 miles, as a heavy swell sets in upon it.

Manzanilla bank.—From Mayaro point a bank with 5 to 9 fathoms over it extends in a NE. by E. direction 13 miles; depths of 11 and 12 fathoms are found for a distance of 8 miles beyond this in an easterly direction, this eastern position being known as Manzanilla bank. The current runs strong over these banks.

Anchorage.—To the northward of Mayaro promontory, with Mayaro point bearing SSE., and the westernmost rocky bluff, near the mouth of Ortoire river, SW., there is good holding ground for small vessels at about a mile from the shore, in 5 fathoms; and at about ½ mile to the

eastward of the Ortoire, behind a projecting rocky point, there is a landing place.

Mayaro bay.—The south part of Mayaro promontory is steep for about a mile in a W. by N. direction, when the land again becomes low and sandy, and trends, with a slight curve, to Galeota point, which bears S. ½ W. distant 12 miles from Mayaro point.

Anchorage.—At the northern part of this bay the sea is sometimes smooth enough to permit of landing on an extent of 2 or 3 miles of the coast, but to the southward of this there is a heavy surf. Off the northern part there is exposed anchorage in 6 fathoms, at about 1½ miles from the shore; but the sea soon rises with the wind, and renders communication with the shore dangerous, and the anchorage unsafe. Coasters manage to ship produce from this position. To the southward of Mayaro point there are some plantations, and, at the distance of 3 miles, a church on the beach.

Galeota point is a small promontory 250 feet high, connected to the main by lower land. It has on its sea face white cone-shaped cliffs, which, when seen from the NE. or SW., make as islands; this point can be seen from a distance of about 20 miles.

Several rocks above water lie off Galeota point, and shallow ground extends nearly a mile in various directions. Vessels are set towards it by the current, therefore it should be approached with caution.

Current.—On the whole of the east coast of Trinidad the current sets in a NW. direction obliquely on the shore, assuming the trend of the land when near; its velocity is from 1 to 2 miles per hour, and in passing over the coral banks off Mayaro point it causes a very confused sea; vessels anchored on the east coast ride very uneasily in consequence.

Guayaguayare bay.—Between Galeota point and Point Grande Calle, lying WSW. ½ W., distant 4 miles from it, the shore forms a deep sandy bight, known as Guayaguayare bay. There is shelter here for small vessels, but a rocky shoal lies nearly in the center of the bay, and there are only 3 fathoms at a mile from the land.

Anchorage may be obtained with good holding ground in 4½ fathoms WSW., ⅔ of a mile from the white islets lying SW. of Galeota point.

The ridge of hills which borders the south shore of the island begins to rise from Point Grande Calle, and NNW., 1½ miles from it, the hill of Guayara rises to the height of 790 feet.

Coast.—The coast from Point Grande Calle trends WSW. for 6 miles to Casa Cruz point, and is everywhere steep, rocky, and unapproachable; the depth at 1¼ miles from the shore is 5 fathoms. The Trinity hills, so named by Columbus on his discovery of the island, lie imme-

diately at the back of this shore, and are 1,070 feet in elevation. From Casa Cruz point to Taparo point the shore trends nearly W. ½ S., with several slight indentations, for a distance of 27 miles. The shore in this space is generally steep, with two or three sandy beaches, and a few rocks off the projecting points which separate them, the hills declining in height to the westward. The land about Casa Cruz point is cultivated, and at ¾ of a mile westward of it water may be obtained, with a little trouble, from a mountain stream which runs into a well on the beach.

Moruga river, 6 miles west of Casa Cruz point, has many rocks about it extending off shore ⅔ of a mile. Boats find their way through them to a smooth landing.

Taparo point.—The coast between Moruga river and Taparo point is from 100 to 150 feet in elevation and thickly wooded; several small cliffy points lie between, named Luna, Curao, Negro, Siparia, Rosa, Palmiste, and Chagoray; these points have a few rocks off them quite close to the shore. The soundings off this part of the coast decrease regularly; a vessel may anchor anywhere off it in 6 to 8 fathoms, sand and mud.

Erin point and bay.—Erin point is situated 1½ miles west of Taparo point; and between Erin point and Islot point, 8½ miles farther west, lies Erin bay, which may be known by three remarkable cliffs in it, the western of which is white, the middle red, and the eastern quoin-shaped. This bay has shallow ground all across it, and on the outer edge of this are two shoals.

Dispatch reef, 5 miles west of Erin point, and nearly 2 miles off shore, has on it 6 feet water. Midway between it and Erin point there is a patch of 12 feet, on the edge of the shallow bank extending from the shore. The quoin-shaped cliff in line with Erin hill (360 feet high) leads over Dispatch reef. To avoid these shoals, keep in more than 6 fathoms, and do not bring Erin point to bear east of ENE. until past them.

Anchorage will be found in Erin bay, at 2 miles West of Erin point, in 4 to 5 fathoms, mud.

Gannet shoal of 6 feet is one of the shallows lying off the entrance to Macareo river on the south side of the approach to the Serpent's Mouth; it lies 8½ miles south of Erin point. As no doubt many shallows exist off the low coast on the side of the channel, vessels should avoid it.

Icacos point.—From Islot point to Quemada point the coast trends WSW. for 6 miles; thence westerly for 3 miles to Icacos point, the southwest extremity of Trinidad. All this part of the coast is low and sandy, and between the two last-mentioned points the shore may be approached within ¼ of a mile.

Light.—A *fixed white* light elevated 39 feet is shown from a white mast on Icacos point; it is visible from a distance of about 5 miles.

Coast.—From Icacos point the shore trends north for one mile to Corral point, and then NE. 1½ miles to Gallos rocks. Columbus bay, lying between Corral and Gallos points, is shallow for ¾ of a mile off shore.

The Serpent's Mouth is the name given to the southern entrance to the gulf of Paria; its extent from Icacos point to the land in the vicinity of the river Cucuina on the opposite shore is 8 miles; it is difficult to navigate from the numerous shoals lying in the passage, and from strong tides, especially in the rainy season.

The Principal Dangers in the Serpent's Mouth are the Wolf rock; Soldado or Soldier rock; the reefs which lie around the latter; and the irregular banks extending off Pedernal river.

Wolf rock, with 4 feet on it, lies 900 yards WNW. of Icacos point. With NE. and S. winds the sea breaks on this rock, but sometimes it cannot be discerned.

Bell buoy.—Wolf rock is marked by a *white* bell buoy placed NNW. ½ W. 200 yards from it.

Three Fathom bank.—Several shoals of 3 fathoms lie N. and NW. of Wolf rock.

A shoal on which the steamship *Demerara* struck in 1873 has 16 to 17 feet on it at low water springs, and is formed of two shoal spots of hard clay and small stones 150 yards apart, with 4 to 6 fathoms around; from the shoalest part Soldado rock bears W., the buoy of the Wolf rock S. by E., and the westernmost Gallos rock, NE. by E., distant 1 6/10 miles.

A buoy has been moored about 20 yards east of the position of the shoal.

Cacique shoal.—This shoal has over it a depth of 2 fathoms, and lies with the western Gallos rock, bearing ENE., and Icacos point S. ⅝ E.

Soldado rock is 115 feet high, and when seen from a distance appears like a sail; when nearer it has a ragged appearance; sea birds resort to it to build, and turtle are abundant around.

Dangerous reefs extend in various directions from Soldado rock. East reef, lying ¾ of a mile to the southeastward, uncovers 2 feet at low-water springs. SE. ledge, with 9 feet on it, lies SSE. ½ E. distant 2 miles from Soldado rock. Pelican rock, at 1 mile S., uncovers 4 feet; and Black rock, 1¼ miles SSW., covers at three-quarters flood. There are also shoals with 12 feet over them, lying WSW. from Soldado rock, distant 1⅔ miles.

To the SW. of Soldado rock, about midway between that rock and the mainland, the shoals of that side of Western channel commence. This part has not been surveyed, but its shallow and dangerous character is known.

Channels.—Of the four channels leading into the gulf of Paria by the Serpent's Mouth, the eastern, or that close past Icacos point, is the best for vessels of moderate draught, and the Middle or Third channel for large vessels, which, however, should use it with great caution; the fourth, or Western channel, should not be used until better known.

First or Eastern channel lies between Icacos point and the Wolf rock. All that is necessary, when proceeding through this channel, is to round Icacos point at 200 to 300 yards distant, and when passing Corral point keep farther off, taking care not to haul into Columbus bay.

Second channel, between Wolf rock and the 3-fathom patches (Three Fathom bank), lying NW. of it, may also be taken by small vessels.

Third or Middle channel, between Three fathom bank and Soldado reefs, is the channel for large vessels; it has depths from 5½ to 7 fathoms. After passing Quemada point, bring Soldado rock to bear WNW. and keep it on that bearing until Cedros point opens of Gallos rocks, bearing NE. by E. ¼ E., when immediately haul to the northward.

Fourth or Western channel, between Soldado reefs and the main is dangerous.

Anchorage.—There is good anchorage between Icacos point and Soldado reef; and vessels should be prepared to anchor when passing through these channels.

Tides.—Near Icacos point, in the Eastern channel, the flood sets about SSW. with a velocity of 1 to 2 knots per hour, and the ebb to the northward at 2 and sometimes 3 knots an hour.

In the Third or Middle channel the flood runs about WSW., at the rate of 2 knots an hour, and the ebb to the northward at 3 or 4 knots.

The tides are overcome in the Fourth or Western channel by the current always setting to the NW. at the ordinary rate of 3 or 4 knots; but in the rainy season this is often rendered more rapid by the outflow from the branches of the Orinoco. It is high water full and change, at Icacos point at 4h. 14m.; springs rise 7 feet and neaps 4.

Columbus bay, between Icacos and Gallos points, is shalllow, there being only 2 fathoms at ½ mile off shore; it breaks heavy in north winds.

Gallos point is remarkable from a group of eight rocks (Gallos rocks), of 20 to 50 feet in height, extending 400 yards in a westerly direction from it; some of these have trees upon them.

Cedros bay, lying between Gallos and Cedros points, is shallow, there being only 2 fathoms at more than a mile off shore; it breaks with strong north winds.

At $1\frac{3}{4}$ miles N. by W., from Gallos point, there is a detached shoal of 3 fathoms, with $3\frac{1}{2}$ and 4 fathoms around.

Barrel of Beef.—A reef extends off Cedros point 800 yards, and at $\frac{3}{4}$ of a mile West of Cedros point there is a shoal which dries at low water, known as the Barrel of Beef.

Loo reef, with 1 fathom on it, lies outside the Barrel of Beef, at $1\frac{1}{4}$ miles W. $\frac{1}{2}$ N. from Cedros point.

Buoys.—On the north side of the Barrel of Beef a *black* buoy, with ball and bell, is placed; there is a channel between this rock and the reef off Cedros point, but only available for small vessels having local knowledge.

A *white* buoy, with staff and globe, is moored in $5\frac{1}{2}$ fathoms at 900 yards WNW. of Loo reef; vessels should not go inside it, or, when working to the eastward, bring it to bear southward of SW., nor get into less than 5 fathoms water.

Rouge point lies $2\frac{1}{2}$ miles ENE. of Cedros point, and West of it distant 1 mile, there is a rock $\frac{1}{2}$ mile off an intermediate projection of the shore, which is marked by a buoy lying to the northward of it in $2\frac{1}{2}$ fathoms.

A detached 3-fathom shoal exisits 1 mile NNW. of Rouge point.

Irois bay, between Rouge and Fortin points, is shallow, but the depth decreases gradually to the shore. In the western part of this bay is the convict establishment of the Colony; it may be known by a white house on the edge of a cliff over the beach in a clearing of the forest.

Guapo bay, east of Irois bay, is also shallow, and the eastern part dries out half a mile at low water. Pelican rocks, situated at the eastern part of this bay, are 5 feet in height, and $\frac{1}{4}$ of a mile from the shore. Four small streams flow into this bay.

La Brea point, situated NE. by E., distant 13 miles from Cedros point, is a prominent projection of the shore, and is remarkable for the celebrated pitch lake, in the vicinity, blocks of which are found on the beach and amongst the trees. A police station is placed on the northern side of the point.

The Pitch lake is situated about a mile inland, with a good road to it from the beach; the surface of the lake is convex, in the center the pitch is soft, but it becomes harder near the outer part.

A small reef, which shows at low water, and is marked by a buoy, extends from the north part of La Brea point, inside of which boats load with pitch.

Anchorage may be taken on any part of this coast; but for a visit to the lake, 1 mile north of La Brea point is a good position, the holding-ground is good, but with northerly winds the landing is very rough.

Water.—In Guapo bay, to the southward of La Brea point, there are two small rivers of excellent water, close to the beach, and easily obtained at high tide.

Oropouche lagoon.—From La Brea point the coast trends E. by S. for six miles to Godineau's river, the entrance to Oropouche lagoon; this large swamp, 12 miles long by 3 miles wide, contains small alligators, and is frequented by great numbers of water fowl; it renders the adjacent county very unhealthy.

San Fernando.—This town, situated 4½ miles NE. of Oropouche lagoon, is well marked by Naparima hill, 591 feet in height, which rises behind it; this hill may be seen in clear weather from a distance of 24 miles, and is very useful to vessels when standing to the SE. from the Bocas. It is the next town of importance to Port of Spain; it contains a population of about 6,000 inhabitants, being regularly built, but of no great extent; the hospital and Roman Catholic church are conspicuous from seaward. A pier, 300 feet long, has been constructed for the increasing traffic of this part of the island.

Shoals.—Between La Brea point and San Fernando, shallow ground extends from 1 to 4 miles from the shore; therefore in working along this coast care should be taken to keep without that distance.

Baillie shoal of 16 feet water is situated NE. by E. distant 4½ miles from La Brea point, and 5 miles W. ½ N. of San Fernando; it is the most outlying shoal in this bight. A buoy marks the edge of this shoal.

Bontour point is the first rocky point to the southward of San Fernando; from it a reef, with rocks which uncover 2 feet, extends 400 yards. At ¾ of a mile W. by S. from this point is situated Farrallon rock, 60 feet high; and to the west of the Farrallon rock, distance $\frac{6}{10}$ of a mile, there is a shoal of 9 feet marked by a buoy. A shoal with 14 feet on it lies west from Bontour point distant $1\frac{6}{10}$ miles; this is the outer shoal in this part of the bay.

San Fernando anchorage is extensive, with convenient depths of 8 to 3 fathoms; the latter being found at 1½ miles from the coast, while 6 feet will be found at 1 mile off. The best mark for anchoring is a conspicuous zinc-roofed house on the north side of the pier, in line with the top of Naparima hill bearing ESE. ½ E.

Farrallon rock in line with a white shed on Remise estate bearing S. by E. will also lead to the anchorage from the northward; these lines cross each other at the inshore anchorage of 3 fathoms.

Water in the San Fernando district is not good; tanks are generally used in the town.

Point á Pierre.—This point, about 2½ miles northward of San Fernando, terminates the western end of the range of hills which extends nearly across the middle part of Trinidad from east to west.

Between the town and Point à Pierre are the little rivers Tarouba and Guaracara, with banks off their mouths; Farrallon rock in line with a cluster of palms bearing S. ½ W. clears Guaracara bank.

Cangréjos point, situated 5 miles NNW. from Point à Pierre, may be recognized by a large banyan tree, seen in nearly all directions.

Cangréjos bay is a slight indentation northward of Cangréjos point, fronted by an extensive flat.

Buoys.—A bank extends from Cangréjos point in a westerly direction for 2 miles, on the edge of which a *white* buoy is placed in 4 fathoms. Off Lisas point 2 miles south of Cangréjos point, another *white* buoy lies 1½ miles from the shore.

Barrancones point is situated 5½ miles N. by E. from Cangréjos bay, and between these are seven sugar estates; a few small cliffs show through the mangrove trees, and a long building (Felicity Hall) is seen at 1¾ miles north of Cangréjos bay. There is a depth of 3 fathoms at nearly 2 miles off shore in this vicinity.

Caroni river is situated 7 miles N. by W. ½ W. from Barrancones point. This part of the coast is low and swampy, and contains also the Blue and Chagouane rivers, both difficult to approach in boats, except at high tide.

Tides.—Between Cedros and La Brea points the flood stream sets SW. and the ebb NE. at the rate of 1 to 2 miles per hour. In the bight off San Fernando the streams are scarcely perceptible, and here it is high water, full and change, at 4h. 38m., springs rising 5 feet and neaps 3 feet; from San Fernando to Port of Spain the tidal streams run in the direction of the coast, the flood being the stronger.

Directions for the Serpent's Mouth.—The most favorable period for entering the Gulf of Paria by the Serpent's Mouth is during the summer or rainy months, when the winds are to the southward of east; indeed, it is seldom attempted at any other time by sailing vessels. In this case vessels of course will keep very much farther to the southward than if pursuing the northern route, to avoid being drifted past the entrance by the strong current running to the NW., which is greatly increased at this period.

The outer part of the Serpent's Mouth, between Galeota point and Baja point on the main land south of it, is 36 miles wide. The current runs here to the westward, from 1½ to 2 knots an hour, increasing in velocity, as it approaches the narrows, to 3 or even 4 knots.

As soon as a vessel has passed Galeota point, she should keep along the Trinidad shore at the distance of about 3 miles, where the depth

will be from 10 to 12 fathoms; and although the water will change its color occasionally, particularly to the eastward of Erin point, there is no danger until the Dispatch reef is approached. Here a vessel should not come within the depth of 8 fathoms.

Having entered the Serpent's Mouth through either of the channels into the gulf of Paria, should it be necessary to work up to Port of Spain, some assistance may be obtained from the in-shore tides, but the coast of Trinidad should be neared very cautiously, and not approached in the neighborhood of Naparima hill, within 5 miles.

The only channel that is safely navigable in the night, is the First or easternmost, near Icacos point; but should the wind fall light before reaching thus far in daylight, it will be far more prudent to anchor, for it would be impossible for a sailing vessel to keep her position to windward against the current.

The land of the delta of the Orinoco is of uniform height, and may be seen from a distance of 15 miles from the deck.

Gulf of Paria.—This gulf is bounded by Trinidad on the east, and by the main land on all other sides. Its greatest length from east to west is 90 miles, and its breadth from north to south 40 miles. It is entered from the northward by the Dragon's Mouth, during the dry season, from November to June, when the winds blow from NE. to ENE.; and from the southward by the Serpent's Mouth, in the wet season, or from July to November, when the wind is generally from ESE. to SE.

The only European settlement within the gulf is at Port of Spain, which carries on a commerce with the interior of Cumanà, by means of the rivers Guarapiche and Caribe, and the town of Güiria, which is situated on the north shore of the gulf.

Güiria.—This town is built on a plateau at the summit of reddish-colored cliffs, and may be recognized from a distance of 12 miles by some conspicuous red cliffs situated 2 or 3 miles northeast of it.

Vessels moor off Güiria in a depth of 5 fathoms, mud and good holding ground, at about one mile from the shore ESE. of the custom-house, which is situated on the beach close north of the town.

Southward of Güiria the coast is low, and at 2 miles south of a headland covered with trees it suddenly trends to the westward.

Trapa is the name of an anchorage on this coast, situated several miles west of Güiria.

Guarapiche river.—This river enters the sea at the southwest part of the gulf, and is navigable for large canoes to a considerable town on its banks, named Maturin. Vessels can proceed up this river to the Caño Colorado, about 27 miles in a straight line.

Aricagua bay.—From Peñas point, the eastern extremity of Paria, the shore to the southwest is faced in many places with reddish cliffs, as far as Aricagua bay which is about 7 miles from the point. A little

to the eastward of this bay, and at ¼ of a mile from the shore are the Patica rocks, which are 3 feet above the sea. The bay is open and the anchorage only fit for coasters; on the east side there are a few inhabitants, and a small stream of excellent water.

Cariaquita bay, about 2 miles northeast of Aricagua bay forms a snug anchorage for coasters. In the entrance there are 3½ to 4½ fathoms, but the current runs across it with such violence that it is not fit for large vessels. On the west side of the inlet there are some settlers, and a little stream of excellent water; but the mosquitoes are insufferable.

CHAPTER V.

COAST OF VENEZUELA, AND ADJACENT ISLANDS.—GULF OF PARIA TO CAPE CHICHIBACAO.

The northern boundary of Venezuela extends from the mouth of the Orinoco to cape Chichibacao, at the western extremity of the gulf of Venezuela, a coast line of more than 700 miles in extent from east to west.

Winds.—Along the coast of Venezuela, and as far westward as cape la Vela, the trade-wind by day follows its regular course from ESE. to ENE., but at night inclines from the land.

Current.—Along the coast of Venezuela, from Trinidad to cape La Vela, the great western current passes along by the range of islands fringing that coast, inclining a little to the southward opposite the channels between the islands, and running at the rate of about 1½ miles an hour.

Between these islands and the continent a counter-current is sometimes experienced, and near the land, in water of moderate depth, tidal action is felt.

Province of Cumaná.—The provinces which terminate on the coast of Venezuela are Cumaná, Margarita, Barcelona, Carácas, Carabobo, Coro, and Maracaibo. Cumaná is the easternmost province, and its seaboard extends from the Orinoco to Conoma point, opposite the Arapos islets, in long. 64° 37′ W.

Coast of Paria.—The name of Paria is given to the narrow mountainous ridge of land which bounds the north side of the gulf of Paria. These mountains rise to the height of 2,000 to upwards of 3,000 feet, are clothed with wood to their summits, and throw off large spurs to the north and south, which terminate at bold projecting points on both shores, forming deep gorges at the heads of the bays.

Peñas point.—The little promontory of Peñas, forming the northeastern extremity of the coast of Paria, is 980 feet high, and nearly separated from the main, being connected by a narrow ridge of land at the head of Celeste bay, about 200 yards broad and 250 feet high; so that when seen from a certain distance northwest and southeast it has the appearance of an island.

Cape Tres Puntas.—This cape lies 52 miles west of La Islette at the NE. extremity of Paria; the intervening coast trends W. by S. 19

miles to Mexillones bay, and then continues W. ½ N.; this shore is cliffy and bold-to, a depth of 20 to 40 fathoms, sandy bottom, will be found at a mile off shore. About 6 miles west of Peñas point there is a peak 3,250 feet high, and at 6 miles farther west, one of 3,500 feet.

Soundings can be obtained at 30 to 40 miles from this coast, but this bank has never been thoroughly examined, consequently it is possible there may be shoals, though none are known.

Unare bay* lies between 2 and 3 miles to the westward of cape Tres Puntas. The bay is about 1½ miles long and ½ mile deep, and is divided into two smaller bays of nearly equal size by a rounded bluff or small *morro*. Each of these bays has a white sandy beach. There are a few scattered huts along the shore, occupied by the laborers employed on the cocoa estates in the vicinity, but there is no settlement worthy of being called a town or even a village; the place is, however, called San Juan de Unare. The landing-place is on a beach to the right of the morro, between two adobe huts, and there is generally surf enough to make the landing disagreeable. The tide rises between 5 and 6 feet.

Cape Malapasqua.—This cape bears from cape Tres Puntas, W. ¾ S., distant 20 miles; the coast from Unare bay curves to the southward, and has various indentations with some rocks lying close to the points, otherwise it may be considered a clear coast.

Testigos islands.—At 40 miles N. ¾ W. from cape Malapasqua, lie a group of islets known as the Testigos, which consist of seven principal islets, besides several farallones or high rocks. The largest, named Testigo Grande or Goat island, is about 2⅛ miles long NW. and SE., and may be seen from a distance of 21 miles; the shores appear bold and the north-extreme is sandy. It abounds in land tortoises, and is inhabited from January until June by a colony of fishermen from Margarita island, but there is no fresh water.

The passages between the above islets are supposed to be free from dangers, but the contrary is the case with the narrow channels between the rocks.

All the islets may be approached within ¼ of a mile except the northeasternmost, which is surrounded by a reef to the distance of ½ mile.

Anchorage.—Between Testigos islands the bottom is sandy, and affords anchorage in case of necessity. The best shelter will be found under the west side of the largest, or Goat island, at about 1½ miles off shore, with the north extreme bearing N., and the south extreme ESE. ½ E., in 15 or 16 fathoms, coarse sand.

* The existing plan of Unare bay is very inaccurate. There is no such point jutting ¼ of a mile to the northward and westward, as is shown on the chart. The U. S. S. *Huron* anchored ¼ of a mile off shore in 8 fathoms. A mile out 13 to 14 fathoms were found, while the plan gives 5½ fathoms 3 miles from the land. A vessel would be dangerously near the beach with the Morro bearing NE., as hitherto directed. (Report of Commander Geo. P. Ryan U. S. N., 1877.)

In approaching the Testigos from the southward the southern end of Testigo Grande or Goat island appears projected against the higher part of the island like a separate island, and a stranger would be apt to seek behind it the passage to the anchorage. The U. S. S. *Huron* in 1877 anchored in 8 fathoms of water to the northward of the reef extending from Goat island. There is an excellent landing on the sand-beach of the bay, formed by the reef and a point to the northward. On a line across the mouth of the bay, from the reef to the point, there are 4 fathoms of water to within a ship's length of either shore, where 2 fathoms will be found.

During the stay of the *Huron* the current ran strongly through the passage to the northward and westward at a rate of from $\frac{5}{8}$ to $1\frac{1}{2}$ miles an hour.

Directions for anchorage off Testigo islands.—This anchorage may be approached either from the NW. or SE.; if from the former direction, a vessel must pass outside a rock lying off the NW. extreme of Goat island; if by the latter, there is a passage between Goat island and another islet lying SW. of it; this channel at the narrowest part (between the rock at the east side of the little island and another about 200 yards from the southwest coast of Goat island) is half a mile wide, with depths of $8\frac{1}{2}$ to 9 fathoms on red gravel.

Current.—The current in the neighborhood of Testigos islands often runs with great velocity between W. and NW. In February its direction has been found even NNW., and its strength 2 knots an hour. In July its velocity may be 3 knots; and in August $1\frac{1}{2}$ knots. It is necessary, therefore, to approach this group very cautiously in the night.

Banks.—Between the Testigos and the main there are soundings apparently all the way, and several detached sand-banks, which have not been examined.

The shallowest yet discovered, which is termed by some the Green bank, lies SSE. about 5 miles from the largest islet of the Testigos group, and has only $4\frac{1}{2}$ fathoms on it; between it and the group there are from 9 to 23 fathoms.

Daring bank.—With the southwest islet of the Testigos group bearing N. by E. $\frac{3}{4}$ E. distant about 10 miles, the water shoals suddenly from 13 fathoms to $5\frac{1}{2}$ fathoms, sandy bottom. For 2 miles in a WNW. direction from this position the depth gradually increases, and with the same islet bearing NE. $\frac{1}{2}$ N. there are 15 fathoms, and soon after no bottom with 20 fathoms.

Cumberland bank.—With the western extreme of the largest islet of the Testigos group bearing N. by W. westerly, distant about 13 miles, the water shoals suddenly from 17 fathoms to 8 and 7 fathoms; the latter depth continues for 2 miles to the southward, when it deepens to 14 and 17 fathoms, with the east extreme of the same islet bearing N. $\frac{1}{4}$ W.

Caution.—As the preceding shoals have never been thoroughly examined, large vessels should avoid them, for much shallower water may exist.

Puerto Santo bay.—From cape Malapasqua the coast trends W., for 8 miles, to the Morro del Puerto Santo, which is connected to the shore by a low narrow strip of sand about ½ mile in length; close off the west extreme of the Morro there is a small islet also known as Puerto Santo. The north sides of both, and the west side of the islet, may be approached to within ¼ of a mile. South of the Morro, about 7 miles inland, is the remarkable mountain of Puerto Santo, 1,945 feet above the level of the sea.

Anchorage.—Off the west side of the sandy neck of land which connects the Morro to the main land, there is good anchorage, with the usual winds, in 4½ to 6 fathoms, sand and mud, about midway between the islet and the main; taking care not to bring the islet to bear northward of NNE., unless in a vessel of light draught, for to the eastward the depth decreases suddenly to 3 fathoms.

Carupano bay.—From the Morro del Puerto Santo the shore trends WSW., 4½ miles, to Hernan Vasquez point, and is foul all the way at ½ mile off. From that point the land curves round to the southward for ¾ of a mile, to the entrance of a small river; it then takes a westerly direction, for 2½ miles, to Salinas or Jarro point, forming the bay of Carupano or Hernan Vasquez.

Salinas point is hilly, and close to it lies a small islet, with a depth of 5 fathoms at 400 yards to the NW.; eastward of this the ground is very foul to near the center of the bay. About half a mile westward of the river is the town of Carupano.

Mount Puerto Santo forms a good mark when approaching Carupano bay, and from a distance of 6 miles seaward the ruins of the light-tower* (of a reddish color) and the houses of the town are plainly seen.

Water.—Good water can be obtained from the stream at the south-east corner of Carupano bay.

Shoals.—With the trade-wind, there is smooth anchorage in the east part of Carupano bay, but great care must be taken to avoid three small shoal patches. The outer and northernmost of these, with 2¾ fathoms on it, lies WNW. ¼ W. 1 mile from Hernan Vasquez point. The westernmost rock, with only 6 feet water over it, is 30 yards in diameter, with 4⅓ fathoms close-to; this rock lies NE. from the islet off Salinas point, distant about 1 mile. The innermost patch, with 3¼ fathoms on it, and 5 fathoms close-to, lies W., ¾ of a mile, from Hernan Vasquez point, and N. ½ W., ¾ of a mile, from the islet off the town.

* This tower is said to be rebuilding, and that it is intended to show from it a *fixed white* light, visible 3 miles.

Anchorage.—There are 5 fathoms water at 400 yards from Hernan Vasquez point, and anchorage must be taken up just within it in 5 or 6 fathoms, sandy bottom.

Merchant vessels generally moor off the town, but the holding-ground is not good; vessels of war moor eastward of this, where the holding-ground is better. Vessels roll heavily at this anchorage.

Landing.—Landing is effected at a mole situated southward of the ruins of the light-house.

Coast.—The coast from Salinas point to Morro Blanco or White point, which bears W., distant 3 miles, from it, has several patches of small rocks lying close to the shore. Nearly south, distant 9 miles from Morro Blanco, may be seen the peak of Monte de San José, which is 1,647 feet high.

From Morro Blanco the coast takes a W. direction, for 4 miles, to Taquien point, and thence WSW. ¼ W., 8 miles, to Esmeralda Morro. All this part is foul, and should be kept at a distance of 2 miles. Between the two first-mentioned points is situated Morro de Padilla, known by an islet and several rocks near it. Taquien point projects farther to the northward than Padilla point, and is also skirted by several islets. The Morro of Lebranche, which is situated westward of Taquien point, is joined to the main by a low sandy, swampy tongue of land.

Garrapatas islets.—This group of small islets lies at a moderate distance from the land between Lebranche and Esmeralda points, but being obstructed by rocks and shoals there is no passage among them; there is said to be a good channel between the most southerly islet and the main; but it will be much better to keep outside them, especially in large vessels.

Morro de la Esmeralda is a small island separated from Esmeralda point by a channel about 100 yards wide. At about 13 miles S. by E. from it is the Redondo or rounded mountain, 1,315 feet high.

Redondo mountain, having a perfectly round summit, is more easily recognized from the offing than either San José or Puerto Santo mountain.

Esmeralda bay.—From Esmeralda point the shore curves inward, forming a large bay, about 1½ miles wide; south of Esmeralda island there is a shallow bank, on which are three small cays, known as the Cascabel islets, lying nearly east and west of each other.

Anchorage.—Esmeralda island is bold and steep-to, and vessels may anchor about ¼ of a mile south of it, in 5½ to 6 fathoms, sand and mud; taking care not to bring any part of it to bear westward of N.

Manzanillo bay.—From Esmeralda bay the coast trends in a westerly direction, for about 5 miles, to the Morro of Manzanillo, and is all

the way skirted at the distance of $\frac{1}{3}$ of a mile by the shoal bank which extends from Esmeralda islet.

At Manzanillo point a small bay is formed, but it is obstructed by the same bank, which terminates at a steep point, about $\frac{2}{3}$ of a mile westward of the bay; a vessel must not steer to the southward until she is to the westward of it.

Guarapoturo rock.—To the westward of the above steep point the coast is quite clear for the space of 8 miles, to Guarapoturo point, where another bank begins to extend $\frac{2}{3}$ of a mile from the shore. About $\frac{2}{3}$ of a mile northeast from Guarapoturo point lies a sunken rock that must be very carefully avoided. A little eastward of this point, and at about 2 miles inland, will be seen the peak of a mountain known as Pico del Este.

Morro de Chacopata.—From Guarapoturo point the coast takes a westerly direction for about 3 miles to Escudo Blanco, or White Shield point, the whole space being steep and high; thence the shore trends about NW. and is very low and swampy for 2 miles, when it rises and forms a hilly promontory known as the Morro de Chacopata, which projects into the sea about 2 miles. The shoal ground still skirts the shore, and approaches within $\frac{1}{3}$ of a mile of Chacopata point.

Chacopata bay.—Between the Morro de Chacopata and Cayman point, lying SW. $\frac{1}{2}$ W. $7\frac{1}{2}$ miles distant, the shore recedes considerably, forming a shallow bay, and off the entrance are situated two small islets. Caribes islet, the easternmost, lies West nearly 2 miles from the center of the Morro. Isla de Lobos, or Wolf islet, is a mile farther to the westward, and has a rock close to its east side.

The shoal ground off the Morro de Chacopata extends to Caribes islet, whence it turns to the south, trending with the shore to Cayman point, off which it does not extend more than $\frac{1}{2}$ mile.

Mountains.—At a short distance inland are the three peaks of Chacopata (Tetas de Chacopata and Cerro de Chacopata), the easternmost of which is 1,398 feet above the sea; at 6 miles to the westward of these is the peak of Cariaco.

Coast.—The coast from Cayman point trends westerly, and is moderately level; the only salient points being those of Tuna, $1\frac{1}{2}$ miles from Cayman point, and the Morro del Castillo, 2 miles farther on. From Castillo point the shore inclines somewhat to the north, as far as the point and Morro of La Peña, a distance of 4 miles; this point bears WSW. $\frac{3}{4}$ W., distant 14 miles from the Morro de Chacopata.

Tuna islands lie NNW. from Tuna point, one at 1 mile, the other at 2 miles distant; the passage is supposed to be deep between them; south of the inner island there is a depth of $4\frac{1}{2}$ fathoms.

A small island lies N. by E. $\frac{1}{2}$ E. from the outer Tuna island, distant $\frac{3}{4}$ of a mile.

Salinas bight.—From the Morro de la Peña the coast is rocky for 3 miles, to point Gorda, and from it a long curved sandy beach, with a rocky point in the middle, connects the high eastern land with the peninsula of Araya at Guachin point.

Peninsula of Araya.—Guachin point bears W. ½ N. 6 miles from Gorda point. From thence the coast trends W. by N. 3½ miles to Escarseo or Eddy point, the northern extremity of the little peninsula of Araya; this part is low and flat. Escarseo point presents a front ½ mile in extent, the western extremity being known as Cardon point.

From Cardon point a low sandy shore bends round to the southwest for 2¼ miles to Araya point and at about ½ mile farther on is situated Chica point. On Araya point there are a few small houses inhabited by salt collectors.

Araya shoals.—The coast from Cayman point to Escarseo point is skirted by a bank extending ½ mile off shore, and which from the latter point extends to the westward at least 4 miles, when it sweeps in towards Araya point, and terminates at Chica point. This part is known as Araya bank, and is extremely dangerous, some of the heads on the outer part breaking in heavy breezes. The discolored water on the edge may be seen from aloft in favorable weather; it is, however, so steep-to, that there are 32 fathoms close alongside the shoals, and before a second cast of the lead can be obtained a vessel may be on shore; there is, consequently, no warning when approaching these dangers in the night.

Coast.—Piedras point bears about SSE. distant 2 miles from Chica point, and the shore between is a flat sandy beach; Piedras point is a bold headland having a sea face of about ½ mile, formed by the western extremity of the high ridge of Guachin, that rises over the southeast side of the peninsula. On the south part of the lofty hill, just within the headland, stands a chapel. The shore here may be approached to within ¼ of a mile in depths of 5 or 6 fathoms.

Directions for rounding Araya peninsula.—Care is required in rounding Araya peninsula, as the banks off its west side may extend farther than indicated. H. M. S. *Esk* in 1821 is said to have touched when 6 miles NW. by W. of Araya point.

If approaching from the eastward, Escarseo point should be kept bearing south of E. by S., until the western peak of Macanao mountain on Margarita island bears N. by E., when a vessel may round the reef on that bearing; and when Araya point bears east, the shore may be approached.

Araya bay.—From Piedras point the shore sweeps slightly in and round to the southward to Barrigon point 3½ miles distant, forming a small bay on the west side of the low sandy part which connects Araya

peninsula with the main. The shore is so steep that it may be approached as close as 200 yards, and anchorage taken up anywhere.

Barrigon point is lofty, and at a short distance within it the land rises to the height of 876 feet; on the north side of the point, where the land begins to rise, there is a castle in a ruinous state.

Arenas point.—From Barrigon point the coast extends about SE. by S. for 2 miles to Caney point, and continues lofty and very clear. At Caney point it changes its direction to SE. by E. for 1 mile to Arenas or Sandy point, which is the southernmost part of this coast, and the northwest point of entrance to the gulf of Cariaco. At Caney point the ground becomes foul, and from Arenas point a shallow ledge extends ½ mile to the southward.

Anchorage will be found in 9 fathoms, sandy bottom, with Arenas point bearing ESE. distant about ¾ of a mile.

Margarita island, a province of Venezuela, consists of two mountains of rock, connected by a low sandy isthmus about 10 miles long and from 60 to 180 yards broad; therefore when seen from only a short distance to the north and south it will appear as two islands.

Its extreme length from east to west is 37 miles, but its breadth varies considerably; the whole area is 444 square miles.

The eastern portion of Margarita island, which is the larger, is 18 miles long, north and south, and about 14 miles broad; near the center mount Margarita, in the Cerro de Copei or la Vega, rises to the height of 3,240 feet, and may be seen from cape Tres Puntas, a distance of about 75 miles. This part, however, is much broken, and contains several summits, having between them cultivated valleys. In one of these valleys, on the southeast side of the Cerro, is situated Asuncion, the capital of the island. The port of entry is at Pampatar, at the east extreme of the island.

The western portion of Margarita island is about 12 miles long from east to west, and 7 miles broad, and consists of nearly an unbroken mountainous mass of rock, known as the Cerro del Macanao, which forms four peaks, on nearly an east and west line, the highest being 4,480 feet above the sea.

The only exports of importance are turtle, fish, poultry, and salt.

Northeast coast.—Ballena point, the eastern extremity of Margarita island, bears N. ¾ E. distant 17 miles from the Morro de Chacopata, the nearest part of the continent. From thence to Cabo de la Isla, the northeastern extremity of the island, the shore trends NNW. ¾ W. for 13 miles, and the whole is clear to within about ⅓ of a mile, to which distance it is bordered by a bank. At 1 mile southward of Cabo de la Isla, and ½ mile from the shore, lies the northernmost of two small islets named Cabo, which are about ¾ of a mile apart.

Northwest coast.—From Cabo de la Isla the northern shore of Margarita island trends SW. ¾ W., 7 miles, to Galera point, which is high

and bold; this part is also free of danger. At 1½ miles NE. by N. from this point there is a small islet named Galera, and between there is a depth of 14 fathoms over sand and shells.

San Juan Griego bay.—From Galera point the coast curves in and round to the southwest, for 3 miles, to Maria Libre point, forming a large bay, called San Juan Griego bay, which is skirted by a bank extending ½ mile from the land; in the center of the bay, at ¾ of a mile from the shore, there is a 2-fathom shoal. An Indian village is situated at the eastern part of this bay.

Anchorage.—A vessel will find anchorage in San Juan Griego bay in 8 fathoms, with Galera point bearing about NE., distant 1 mile. In approaching it from the northward and eastward the soundings will be regular, from 30 fatsoms at 12 miles off, to 6 fathoms at a moderate distance from Galera islet.

North bay.—From Maria Libre point the shore takes a southerly direction, about 4 miles, to the east extreme of the sandy isthmus which connects the two peninsulas of Margarita island. The sandy beach trends westerly for 10 miles, and is generally from 10 to 12 feet only above the sea, but there are a few hillocks here and there. The west extreme is swampy, and from thence the shore trends NW. and N., for about 5 miles, to Tunar point, which is the northeastern extremity of the western peninsula.

The whole of this bay, which is 11½ miles wide, is clear, being only bordered by a bank, which, at the widest part, extends about ½ a mile from the land. A reef extends ½ a mile in a NNE. direction from Tunar point. From the latter the coast trends W. by S., 8 miles, to Tigre point; it is clear, and may be coasted at a little more than ½ a mile distant. From the latter point the shore takes nearly the same line of direction, 2½ miles, to the Morro del Robledar, the northwestern extremity of Margarita island.

West coast.—From the Morro del Robledar the west coast of Macanao peninsula sweeps round to the south and southwest, for 4½ miles, to Arenas point, which is the western extremity of Margarita island. Between the Morro del Robledar and Arenas point, the reef which borders the coast is said to extend about 1½ miles from the western part of the island.

Ostial shoal.—The southeastern edge of a rocky shoal known as Ostial shoal lies NW. 4½ miles from Arenas point, and W. by S. 4½ miles from the Morro del Robledar; it has on its shallowest part 4½ fathoms. This shoal is 3 miles long in a NW. and SE. direction, and 1 mile wide. Between it and the Morro there are from 5 to 7 fathoms over sand and mud; to the northward and westward the soundings extend to a considerable distance; but to the southward and westward the bank is steep-to.

South coast.—Bay of Pampatar.—Between Ballena point, the eastern extremity of Margarita island, and Moreno head, situated SW. ½ S. 3½ miles distant, the coast forms two small sandy bays, separated about midway by a rocky point. On the shore of the northernmost bay is the town and castle of Pampatar, and on a rocky point eastward of this is fort La Carranta, which protects the anchorage in front of it; from this point rocks extend 400 yards. The southernmost bay, port Moreno, is quite free from danger.

Blanco islet.—Nearly on the line, and midway between Ballena point and Moreno head, is a small islet named Blanco, which has a rock close off its northeast end. From its south end a ledge extends 200 yards to the westward; and a reef is said to extend from its southeast side; the passage between it and Margarita has no danger, and carries from 5 to 8 fathoms.

Anchorage.—Both of the above bays being completely exposed to the eastward, they are only safe with moderate trade breezes, although it is said that not much sea is thrown in. All parts of them afford anchorage in 7 and 8 fathoms, but the farther out and to the northward a vessel lies the better, in order to be able to fetch round Moreno head if forced to leave.

A convenient berth for getting to sea will be found with fort La Carranta bearing NW. ½ N., about a mile distant, in 8 fathoms. In sailing out it will be better to pass to leeward of Blanco islet.

Coast.—The coast from Moreno head, which may be passed at ¼ of a mile distant, curves round to the SW. to Mosquitos point, forming the deep bay of La Mar, 6 miles wide; it is so foul that it would be hazardous to approach within 2 miles of the shore. On the north part stands the little village, of straw huts, which gives its name to the bay.

From Mosquitos point to Mangles or Mangrove point, which bears W. by S., distant 10 miles, the shore again curves inwards, and is still foul at a mile from the land. About 3 miles westward of Mosquitos point there is a small lagoon, Laguna Chica.

From Mangles point the shore curves to the northward for a short distance, and then to the westward to Piedras point, 3¼ miles distant; here it again sweeps round to the north and west, forming Mangles bay, with Pozo point, which is 6½ miles from Piedras point, and WNW. 10 miles from Mangles point. This part is foul to the distance of a mile from the shore.

At 5½ miles NW. ¼ W. from Piedras point is the entrance of Laguna Grande or Arestinga, which is 10 miles long, from east to west, and about 2 miles broad, and is bounded on the north by the Sandy isthmus that connects the two peninsulas. The water in it is salt; at its east end stands the village of San Juan.

From Pozo point the shore trends W. ¼ N., 12 miles, to Arenas point, the western extremity of Margarita island. For 6 miles west of Pozo

point the coast is foul, and should not be navigated nearer than 2 miles; but to the westward of this it is more bold.

Los Frayles.—At 8 miles, ENE., from the northeast point of Margarita island, lies a group of small islets, 5 miles in extent, north and south, known as Frayles or Friars. The southernmost islet is the largest, and is about 300 feet high; they are said to be all bold and steep-to except the northernmost, which is surrounded by a reef to the distance of ¼ of a mile.

About 2 miles north of Los Frayles lie two dangerous isolated rocks 20 feet high, which render the approach from the northward dangerous during the night.

La Sola island.—This solitary little islet is situated NE., 12 miles, from the largest of Los Frayles, and W. by S., 27 miles, from the north extreme of the largest islet of the Testigos group, and is steep-to all around. In the passages between these islands it is supposed there is no danger.

Channels between Margarita island and the Main.—Between Margarita island and the main the passage is obstructed by two islands, named Coche and Cubagua. Coche, the easternmost island, lies nearly in the middle of the passage, and is 6 miles long ESE. and WNW. and 3 miles broad. It is of considerable height, except the northwest point, which is low; the island is surrounded by a rocky ledge and reef that extends about 3 miles from the northwest point, and 1½ miles from the southeast point. There are thus two channels, each about 2 miles wide; the one to the northward towards Margarita island, and the other to the southward towards the coast of the mainland. The northwest end of Coche island terminates in a dry sandy spit, which extends from the body of the island in a NW. direction 1¼ miles.

Cubagua island lies 9 miles to the westward of Coche island, and is about 5 miles long, east and west, and 2 miles broad. From the east end a reef extends about a mile, leaving a clear channel between it and the ledge off Mangles point 3 miles wide, carrying 10 and 12 fathoms. The north and south sides of the island are steep-to, but on the west side shoal ground extends from ½ to 1 mile from the land, and a shoal of 5 fathoms lies SW. by S., distant 3 miles, from the SW. point. The northern channel, between the edges of the rocky ledges which skirt Coche island and Margarita, is quite clear.

Sapphire shoal.—At the eastern entrance of the southern channel, between Coche island and the main, there is a most dangerous shoal of 15 feet water, called Sapphire shoal, from which the Morro de Chacopata bears ESE. distant 2½ miles, and the west end of Caribes islet S. distant 2 miles.

In December, 1877, the French frigate *La Victoire* struck on this shoal, which was found to extend farther to the southeast than was formerly

supposed. An examination by the French vessel of war *Dupetit Thouars* has shown that, from the position of the northwest edge of the shoal, a series of sand-ridges, with depths of 16 to 19 feet, and 4¼ to 5¼ fathoms between them, extend to the southeast, thus narrowing the passage south of Sapphire shoal to about ½ mile in width. The soundings in the passage are irregular, and vessels drawing more than 22 feet should not attempt it. Vessels should not use the passage between Sapphire shoal and Coche island, as irregular depths of 13 to 26 feet have been found in it. According to local authority the shoal is subject to frequent changes.

Anchorage.—The bottom elsewhere in both the above channels affords anchoring ground in case of need, but better shelter will be found off the southwest side of Coche island, with the west extreme of that island, which is low and sandy, bearing NW. by N. and the southeast extreme bearing E., in 9½ fathoms, mud, about 2 miles off shore; or under the west end of Coche island with the north point, which is also sandy, bearing NE. by E.; the west end, E.; and Mangles point NNW., in 8 fathoms, mud, at 2 miles from the island.

Directions.—In navigating the channel to the northward of Coche and Cubagua islands, a vessel approaching from the eastward should enter midway between Coche island and Mosquitos point, and in passing point Carnero incline towards it, to avoid the northwest reef off Coche island; the channel north of Cubagua island is better known than that to the south.

The south channel, between Coche island and the main, is dangerous on account of Sapphire shoal, which lies in the fairway. In entering from the eastward a vessel of moderate draught should pass southward of this shoal, keeping about ¾ of a mile from the Morro de Chacopata, in 6 fathoms, and from thence steering direct for Lobos island, which is steep-to.

In steering toward Tuna islands, lying off Tuna piont, the depth increases rapidly; Tuna islands are bold-to, and the channel between them clear, but it will be better to pass outside, and from thence steer west to avoid the end of the Araya bank, already mentioned. Neither of these channels should be navigated during the night, and if there is not sufficient daylight left to carry a vessel to the westward of Araya bank when bound to Cumaná, it will be better to anchor for the night under Coche island, as the current is strong and variable.

Gulf of Cariaco.—This gulf is about 35 miles long east and west, and 8 miles broad at its greatest breadth, which is near the middle.

The entrance between Arenas and Carenero points is 2¾ miles wide. The former point is foul to the distance of about half a mile; the latter is steep-to at the extremity, but between it and Baxa point, which bears E., distant 4½ miles from it, and from thence to Morro Blanco, about

2½ miles to the SE., the shore is skirted by a rocky ledge to the distance of nearly a mile, which is steep-to; elsewhere the shores of the gulf are clear, safe, and bold.

Anchorage can be obtained over the whole of the eastern part of the gulf, at the head of which there are numerous lagoons.

Laguna Grande del Obispo.—On the north shore of the gulf, about 10 miles eastward of Arenas point, is a small cove known as Laguna Chica, and at 1½ miles farther east there is another of much greater extent named Laguna Grande del Obispo, the entrance to which is ¼ of a mile wide, with a depth of 11 fathoms in mid-channel; within the entrance there are 10 to 16 fathoms over muddy bottom, and almost all the dangers are visible; neither of these places nor the gulf itself is of any importance to navigation, and they are consequently seldom visited.

Cumaná.—The plain on the southern shore of the gulf of Cariaco extends about 10 miles inland to the offsets of the Cerro del Bergantin, which, at 25 miles south of the entrance of the gulf, rises to the height of 4,935 feet. On this plain is a group of isolated hills, and on the northwesternmost, which is only a mile within Carenero point, stands, at about 180 feet above the sea, the castle of San Antonio, which protects the town of Cumaná lying on its western side; this hill, however, is commanded on the east by a more lofty but unfortified summit. A little below the castle, on the southwest slope, stand the ruins of the castle of Sta. Maria.

Cumaná is the capital and chief port of entry of the province. It is inclosed on the south and west by the small river Manzanares, which, from near the town, forces its way through the sandy shore at three different points; one towards the north, known as the Caño de Sta. Catalina, and two towards the west. The centre branch, which enters the sea about ½ a mile to the southward of Carenero point, is navigable for canoes. In the rainy season small vessels can ascend to the town by this branch. On the west bank, opposite the city, there is a larger Indian suburb.

The shore from Carenero point trends south 2¼ miles to the Morro Colorado, or Escarpado Roxo, a little hill with a red cliff, and thence SW. 2½ miles to Piedras point. About ¾ of a mile eastward of the latter point is the entrance to the river Bordones. From Carenero point to the southern mouth of the Manzanares, a mile distant, the shore is bold and steep-to; but from thence a coarse sand-bank, with 1 to 2½ fathoms over it, extends from the shore to a position 1 mile WNW. of the red cliff, and SW. by S. from Carenero point; and then, taking a southerly direction, it terminates at Piedras point.

Light.—A custom-house, forming a conspicuous object when seen from seaward, stands near the entrance to the middle branch of Manza-

nares river. From a staff near the custom-house there is shown a *fixed white* light, visible 5 or 6 miles.

Water may be obtained from the middle branch of Manzanares river, but it will be necessary to proceed ¼ of a mile up the river.

Anchorage.—The anchorage off Cumaná is confined to the space between Carenero point and the southernmost mouth of the river Manzanares, and the best position is within ¼ of a mile of the shore, for outside this the depth increases suddenly, especially to the northward of the fort. A good inner berth will be found with the castle of San Antonio bearing E. ¼ S., and the summit of the northernmost cliff of Morro Colorado bearing S. ¼ E., in 14 fathoms, mud and clay.

It will be better to steady the vessel with a kedge or stream anchor to the SW., or towards the shore. The wind generally blows from the land, but there is often a land and sea breeze, the latter setting in from the WNW.

Caution.—In working up to this anchorage, a vessel must not stand farther to the southward than to bring the castle of San Antonio to bear E. by S., to avoid the bank off the red cliff.

Tides.—The rise of tide at Cumaná is from 4 to 5 feet.

Port Escondido.—From Piedras point the coast trends west for 3½ miles to port Escondido; in some parts it is cliffy, and in others bounded by a sandy beach. This port is merely a bay, ⅛ of a mile wide at the entrance, and about ½ mile deep. In the middle of it there are 4½ fathoms over sand, but nearer the shore only 3 and 2 fathoms; off the west entrance point there are some rocks extending 200 yards.

Campanarito bay.—From the west entrance point of port Escondido the coast trends in a westerly direction, 1¼ miles to Campanarito point, and is cliffy and clear, with the exception of a sunken rock, which lies 100 yards from the shore, and ¼ of a mile to the westward of port Escondido. From Campanarito point to the Morro and the lookout tower of Mochima, the distance is ¾ of a mile; in this space the coast forms a bay with depths varying from 16 to 5½ fathoms, which will be found within 200 yards of the shore. A few rocks extend to the north and west about 100 yards from Campanarito point.

Port Mochima.—The lookout tower before mentioned stands about ½ mile eastward of the east entrance point of port Mochima, which is one of the best harbors on this shore. The entrance is nearly a mile wide; but ½ mile within, it narrows to ¼ of a mile in a short channel leading to the inner basins. The port is 4 miles in length, north and south, and the shores are indented with several small coves, which are bold and deep. The depths are everywhere regular, deepening from 3 to 4 fathoms at 200 yards from the land, to 14 and 16 fathoms in the middle. All the dangers lie close to the shore, and are easily avoided.

Water may be obtained from the river Mochima, at the head of the harbor on the south shore. It is not, however, a convenient place, but by clearing away the obstructions which collect a little above the mouth, enough might be procured for any number of vessels.

Anchorage.—The most convenient temporary anchorage will be found in either of the two coves nearest to the entrance on the east side of the harbor, outside the narrows, mooring with a cable or hawser to the shore. A vessel may proceed to sea from either of these places with the usual sea breeze; but from the anchorages within the narrows, it will be necessary to await the land wind, which genèrally comes off towards evening.

Port Manare is situated about a mile westward of port Mochima, and is also an excellent port. The entrance is spacious, the shores are clear, with depths of 14 to 4½ fathoms at 100 yards from the land; vessels may pass in and out with the sea breeze.

Tigrillo bay.—From Manare point, the west entrance point of port Manare, the coast takes a SW. by W. direction for 1½ miles to Tigrillo point, from which a reef extends 100 yards. From thence the shore sweeps round to the southward and eastward for 2½ miles, and then returns to the WSW. for 5 miles to Gorda point, forming the bay of Tigrillo, at the inner part of which a canal communicates with the southwest part of port Mochima.

Caracas islands.—In the entrance of Tigrillo bay there are three islands; the easternmost is known as Venados; the middle one, the Caraca del Este; and the third, the Caraca del Oeste.

From Campanaria point, the north extreme of Venados, a rocky ledge extends 200 yards; and from the southwest end of the same island a shallow bank extends 200 yards; elsewhere the shores, both of the bay and islands, are considered free from danger, and steep-to. The channels between the islands are narrow, but they are navigable for vessels of large draught, and afford sufficient room for anchoring, if necessary.

Caraca shoal.—The only danger to be avoided, in the vicinity of the Caracas islands, is a rocky shoal, about ½ mile in extent, from east to west, known as the Caraca shoal, which lies about NW. 1½ miles from the Caraca del Este. There is not, however, much risk in passing between it and the Caraca del Este, as it will be avoided by keeping near the latter; and in going outside of it, by keeping Manare point bearing southward of E. by S.

Picuda Grande islet.—About 1½ miles to the westward of Caraca del Oeste, and NW. 2½ miles from the western extremity of Tigrillo bay, there is an islet named Picuda Grande, which is about a mile long NE. and SW. About ¼ of a mile from its eastern extremity there is a

sunken rock; and off its northeast point are two dry rocks, one 200 yards, and the other 600 yards distant. Elsewhere the shores are clear and steep-to.

Gulf of Santa Fé.—The entrance to this gulf is formed between Gorda point, the western extremity of Tigrillo bay, and Escarpado Roxo, or Red cliff, which is 3 miles to the SSE. The gulf extends inland in an easterly direction for about 6 miles; its shores are clear, but at the entrance, about $\frac{1}{8}$ of a mile from the north shore, there is rock which should not be approached within $\frac{1}{4}$ of a mile; the depths in the gulf are from 27 to 18 fathoms, on muddy bottom.

Bay of Cruz.—From Escarpado Roxo the coast inclines to the southward, and then to the westward for $1\frac{1}{2}$ miles, to Cruz point, forming a bay that is very clear, with excellent anchorage. South of the bay, about 4 miles inland, the peak of Sta. Fé rises to the height of 3,372 feet.

Arapos islands lie W. by N., 1 mile, from Cruz point, and extend altogether to the westward about $\frac{1}{2}$ mile. The passage between the easternmost and the coast is open and without danger, but the islets are connected by a shallow bank and reef, which is impassable. Off the western part of the westernmost islet there are two rocks which are steep-to.

Coast.—The coast from Cruz point trends westerly, inclining a little to the southward, nearly 4 miles, to Conoma point, which forms the western limit of the province of Cumaná. The whole of the shore between these points is free of danger, and navigable within 400 yards.

Conoma bay.—Between Conoma point and Pertigalete point, which bears west distant 2 miles from it, the shore forms a fine bay, with 12 fathoms water at 200 yards from the land. It is all clear except on the eastern part, from which a reef extends 200 yards from the shore. Two small rivers force an entrance into it through the sandy beach at the inner part.

Monos or Guaracaro island lies in front of Conoma bay, about $\frac{1}{8}$ of a mile to the northward of Pertigalete point, leaving a clear channel between with 45 to 50 fathoms water close up to the island. About 400 yards from the north side of the island there is a rock and a reef, which should not be approached nearer than 100 yards. The channel between Monos and the rock is clear, with 25 fathoms water, and in sailing through it will be best to keep the island aboard.

Pertigalete bay.—At $1\frac{1}{2}$ miles to the westward of Pertigalete point is Guanta point, and between them is Pertigalete bay, within which are several small islets; a little river flows into it. Pertigalete point is foul towards the west, and should not be passed at less than 200 yards distant; a reef and shoal lie also in the center of the bay.

Anchorage.—Vessels entering this bay from the eastward must give Pertigalete point a berth of at least 200 yards, to avoid a reef which extends from its western side, and also be careful not to get westward of the most easterly part of the northern islet, to avoid the shoal in the bay. A good berth will be found with the mouth of the little river bearing S., in 4½ fathoms, about 300 yards from the beach on the east side of the bay.

Guanta bay.—From Guanta point the coast trends westerly 3 miles to Bergantin point, and between them, about a mile from the former point, is the little bay of Guanta, in the outer part of which lie several islets and rocks, with narrow but clear navigable channels between them. A reef extends about ¼ of a mile from the west side of the bay, but off the east side there are 15 to 9 fathoms water at 100 yards from the shore.

Bergantin bay.—From Bergantin point a reef projects about 200 yards, and extends about a mile to the southward. Off the southwest side of the point there is an islet with foul ground between it and the shore, leaving no passage; from thence the coast continues in a westerly direction, forming Bergantin bay, the southern side of which is also foul.

Pozuelos bay.—From the west extreme of Bergantin bay the coast sweeps round to the southwest for about 4 miles, and then turns to the northwest and north for 2 miles, terminating at the Morro of Barcelona. The bay thus formed is known as Pozuelos, and is 4¾ miles wide; the land is everywhere very low, and bounded by a sandy beach, which is skirted by a shallow bank to the distance of about a mile. Vessels should, therefore, not come within the line of Bergantin point and the Morro, or within the depth of 7 fathoms, sandy bottom.

Barcelona bay.—The Morro of Barcelona is a remarkable narrow, hilly peninsula, about a mile in length from north to south, connected to the main, in an ESE. direction, by a very narrow low ridge of sand of about the same length. The northern extremity of the Morro is so steep that it may be passed at 200 yards distant, but the west side is foul to the distance of ¼ of a mile.

From the south end of the Morro the shore bends in to the southeast and round to the southwest, and forms a bay between it and Maurica point, 3 miles wide and nearly 1 mile deep; but the river Neveri, flowing into it at several points, throws out such a body of sandy mud, that on a direct line between the points there are only 3 fathoms water, and on this bank the sea breaks heavily. The Neveri is navigable for small boats 40 miles, and for large bongos to the distance of 18 miles.

About 1½ miles inland, on the left bank of the river, stands the city of Barcelona, the capital of the province.

Anchorage.—The best anchorage for vessels in the bay of Barcelona is with the rock off the West Chimana island just open to the westward

of the Morro of Barcelona, in 4½ fathoms. Those of very light draught may go into 3½ fathoms, with the Morro bearing NE. ¼ N. and the peaked rock of Borrachitos NW. ¾ N.

The French vessel of war *Dupetit Thouars*, in 1879, anchored 2 miles west of the custom-house, a large white house on the beach close southward of the southern branch of Neveri river, and near which good landing can generally be effected.

Outlying islands.—Between Conoma point and the Morro of Barcelona are several small islands and rocks, which extend to a distance of from 3 to 7 miles from the land. Picuda Chica, the easternmost of these islets, lies SW. 3¾ miles from the Picuda Grande, and about 3 miles to the northward of Conoma point. It is of a circular shape, about ⅛ of a mile in extent, clear and steep-to.

Chimana islands.—At 1 mile SSE. from Picuda Chica, and nearly the same distance to the northward of the rock off the north side Monos island, is the Chimana del Este, which is smaller than Picuda Chica, and steep-to.

West 2 miles from this islet is situated Chimana Segunda, which is about 1⅛ miles long east and west, and very clear. To the eastward of it are two little islets, the nearest lying about 200 yards, and the other ½ mile from it; off the west side is another islet, distant about 200 yards.

Chimana Grande, lying SW. about 400 yards from Chimana Segunda, is of irregular figure, and its greatest extent from ESE. to WNW. is about 3½ miles.

Chimana del Oeste, about ⅓ of a mile to the westward of the above, is joined to it by a shoal of rocks and sand, extending fully ½ mile to the northward of the northern extremity of Chimana Grande. On this shoal, and midway between these two islands, there is an islet, and a short distance to the westward of the western Chimana there is another.

Chimana del Sud, about 2 miles long from NE. to SW., is separated from the southeast end of Chimana Grande by a clear channel about 300 yards wide, with a depth of 20 fathoms, mud; also from Bergantin point by a passage ½ mile wide, and the only danger here is the reef which extends about 200 yards from the point.

Between Chimana Grande and Chimana del Sud, there are several islets, all steep-to.

It appears that these islands and their outlying islets are bold and steep-to; the only dangers being the rock off the east side of Picuda Grande, and the shoal which connects the great and west Chimana; consequently all the channels between these islands are navigable, although some of them, from being very narrow, are not navigable for large vessels; this circumstance, however, is a matter of choice for the navigator; in other respects he has no hidden danger to guard against.

Borracha island, lying about 2 miles westward of the west Chimana, is rather more than 2 miles long from north to south, and 1½ miles at its greatest breadth. The east and north sides are free from danger; but from the northwest part a shallow, rocky bank extends to a considerable distance, having on it several small islets, the most westerly of which must be passed at the distance of at least ¼ of a mile. This island, the Caracas, and Picudas are visible from Cumaná, from whence they have the appearance of fortifications; the former is 35 miles distant.

Borracho and Borrachitos islets.—From the south extreme of Borracha a large sand-bank extends about SSW. nearly 3 miles, and on it are the Borracho and Borrachitos islets. The first lies close to Borracha; the others, which are two very small islets, are 2 miles from Borracha. There is no passage between any of them, and the southernmost Borrachitos, which is peaked, and has the appearance of a sail, should not be approached within ⅛ of a mile.

Unare river.—From Maurica point, the southwest extreme of Barcelona bay, the coast trends to the southwest for 4 miles, and then takes a westerly direction for 33 miles to the entrance of Unare river, which forms the western boundary of the province of Barcelona, and is navigable for boats a distance of 80 miles. The whole of this coast is very low, but 2 miles to the eastward of Unare river is a little hill, named Morro de Unare, and 7 miles farther eastward is the Morro de Piritu, which is a little more inland, and rises to the height of 1,568 feet. A flat of sand runs gradually off from the shore, and at the distance of about 5 miles there are 12 and 13 fathoms. The 100-fathom edge of the bank lies about 22 miles from the land, nearly midway across to the island of Tortuga.

Piritu islands.—West about 10 miles from Maurica point and 3½ miles from the mainland are two small, low, sandy islands, with some mangroves on them, named Piritu, from which a reef extends about 300 yards. There is a passage between the two islands, but it is hazardous to attempt, for the reefs on either side leave a channel only 400 yards wide with 5½ fathoms water. The passage between them and the main may be freely navigated by vessels of any size, attention to the lead being all that is required.

Los Hermanos islets.—At 40 miles N. ¼ W. from the northwest point of Margarita island lies the southernmost of a group of seven wooded islets, known as the Hermanos, which occupy a space of 8 miles in a NW. by N. and SE. by S. direction. The three southernmost (the northernmost of which is called Pico, 570 feet high) lie close together, and are separated from the others by a clear channel 3 miles wide. The southernmost of the other four is named Orquilla; this is the largest, and about 650 feet high. Most of them are high, bluff, conica

rocks, and when bearing ESE. several of them may be seen above Blanquilla island; they are all clear and steep-to, and there are no soundings in the passages between them.

Blanquilla or Blanca island, lying 7½ miles westward of the northernmost of the Hermanos, is 6 miles long north and south, 3 miles broad at the south end, and 1½ miles at the northern extremity; it is very low, flat, and sterile, and its shores are chiefly white cliffs. Several rocky ledges extend to the distance of ⅓ of a mile from the southwest point, and foul ground about ¼ of a mile from off some parts of the west side, and off the north extreme.

Anchorage.—There is anchorage in 18 fathoms, at a mile from the northwest shore of Blanquilla island, to 6 or 7 fathoms at ⅓ of a mile from it, sandy bottom; also with the southwest point of the island bearing N. ½ E. about a mile distant, in 8 or 9 fathoms, white sandy ooze.

Tortuga island, the east extreme of which is 47 miles westward of Margarita island, and north about the same distance from Morro de Unare, is somewhat oval in form, 12 miles long from east to west, and about 5 miles broad in the middle; the eastern part is about 100 feet high, the western portion is low, and both terminate in distinct points.

The north shore from Oriental point, the eastern extremity of the island, to Delgada point, and from thence to Ranchos point, near the middle of the north side, is clear, with the exception of a rocky ledge, which extends about ¼ of a mile from Delgada point.

Off the northwest shore, between Ranchos and Arenas points, there are several small islets and foul ground, which necessitates attention to the lead. The first westward of Ranchos point is Anguila cay, which lies about ½ mile from the shore, with shoals inside it. The next west, known as Herradura or Horseshoe cay, is about a mile from the shore, with a navigable channel between, but too dangerous for strangers or large vessels; from the northeast part of this cay a rocky ledge runs off to the eastward about ¼ of a mile. Tortuguillos, the westernmost, are two small islets lying close together about the same distance off shore as Herradura, and are surrounded by a very shallow bank.

Between Oriental point and the middle of the south shore there are several small islets lying at a short distance off; but to the westward of them the coast is bold and steep-to. On the south side of Arenas point, the western extremity of the island, there is a small village.

Anchorage.—The only anchorage is between the shore of Tortuga island and the Tortuguillos; it may be entered either from the northward, passing between the eastern Tortuguillo and Herradura, or from the southwest between the former and Arenas point; the only precaution required is not to get into a less depth than 6½ fathoms.

Province of Caracas.—The northern boundary of Caracas—which is the largest province of Venezuela—extends from the river Unare to Aroa point, a seaboard from east to west of about 165 miles.

From Unare river the coast trends W. by N. 50 miles to the entrance of the river Higuerote; it is all along very low and swampy, without any elevation whatever. Several small rivers reach the sea within this space, the principal of which are the Tuy, Capira, Orquilla, Paparo, and Higuerote.

Lake Tacarigua.—About 34 miles west of the entrance of the Unare is the entrance to lake Tacarigua, which is 15 miles long and more than 6 miles wide, and contains an incredible number of fish of different kinds. It is separated from the sea by a narrow strip of lowland, over which in one place the sea breaks at high water. Its depth does not exceed 4 fathoms.

Tuy river is about 154 miles long, and, after draining the principal valley of the coast range of mountains, empties into the sea about 4 miles westward of Tacarigua lake, and is navigable for small river barges about 68 miles.

Higuerote river.—The entrance of this river lies about 13 miles farther to the westward. The shore in front of it, and for a distance of about 6 miles to the NNW., is fringed with many small cays and reefs, which extend 4½ miles from the land. At 14 miles NE. from the mouth of the river there are 35 fathoms, muddy bottom.

Carenero bay.—At the north extreme of the above cays the shore forms a small bay, and from thence turns to the northeastward for about 7 miles to cape Codera, and appears to be clear and bold. This bay is probably the harbor or anchorage mentioned by some authorities, from whence is shipped the exports of the river Higuerote.

Water.—There is a large lagoon in a WSW. direction from the above anchorage, from whence good water can be obtained.

Anchorage.—The shore of Carenero bay is low, but to the westward there is some remarkable table land, which, by being brought to bear WSW. or SW. by W. will lead a vessel to the anchorage; a convenient berth lies with cape Codera bearing N., or N. by E., and distant about 2 miles from the shore, or farther in according to draught.

Cape Codera, a well-known headland on this coast, bears W. by N., 85 miles, from the Morro of Barcelona, and SW. by W. ¼ W., 47 miles, from the southwest end of Tortuga island. The cape forms a very round morro or hill, about a mile to the northward of which a tongue of land (West point) projects that has a rock close off its northwestern extremity, which is so steep that at 100 yards there are 9 fathoms, sandy bottom; at 9 miles to the eastward of it there are 43 fathoms, and at 6 miles to the northward, 42 fathoms.

From thence to the westward, as far as La Guayra, the coast is bounded by the great mountain ridge of Caracas, which in most parts rises abruptly from the shore, and at only a short distance inland reaches an elevation of between 3,000 and 4,000 feet. South of Maspa point, about 10 miles inland, mount Caculo rises to the height of 7,430 feet.

Corsarios bay.—Between West point of cape Codera and Caracoles point, 2¼ miles to the westward of it, the shore forms a bay about ¾ of a mile deep at the east side. The southeast corner for about ⅓ of a mile is low, sandy, and swampy; to the westward of this the shore is foul to the distance of about 100 yards all the way to Caracoles point, which has a small rock close to it, and a reef that runs off 200 yards.

Anchorage.—Close under the west side of West point, and just within it, there is anchorage in about 7 fathoms, at ¼ of a mile from the shore in using it a vessel should bring up as soon as she is within shelter from the wind.

Centinella islet.—At nearly 14 miles N. ¾ W. from Cape Codera, lies an islet about 75 feet high, which appears like a ship under sail, known as the Centinella or Sentinel rock. It is very bold except near the north side, where there are two sunken rocks, having between them and the islet a channel of great depth.

A rock, just above water, lies about NNW. ½ W. from Centinella island, distant 600 yards.

Coast.—The coast from Caracoles point takes a WNW. ½ W. direction for 9½ miles to Maspa point; it then trends WSW. 2½ miles to Chuspa point. All this shore is skirted by a reef, which extends 1 mile to the northward from Maspa point, terminating at Chuspa point; for this reason it should not be approached within 2 miles.

Chuspa bay.—From Chuspa point the coast trends about SW. 1½ miles to the entrance of the small river Chuspa, on the east bank of which, at about ¼ of a mile inland, stands the town of that name. From thence the shore trends to the westward, 1½ miles, to Curuao point, to the southward of which, about ⅓ of a mile distant, is the town of Curuao.

Caution.—Between Chuspa and Curuao points, Chuspa bay is very clear, and the anchorage excellent; the only guide required for entering is the lead, but in working up from the westward, care should be taken not to bring Maspa point to bear northward of E., before Curuao point bears westward of S., to avoid Sábana bank, the east extreme of which lies 3 miles westward of the anchorage.

Sábana bank.—From Curuao point to Frayle point, which is 4 miles farther to the westward, the shore is foul to the distance of ¼ of a mile.

About 200 yards from the latter point there is a small rock. Between Curuao and Frayle points there is a projection of the land named Sabana; and about a mile north of it lies the southern edge of a rocky

bank, 1 mile in its greatest extent, SE. and NW.; the general depths over it are from 8 to 4½ fathoms, but in some places there are 2½ fathoms. As already stated, great care must be taken in approaching this part from the westward.

Coast.—The coast from Frayle point trends W. ¼ S. 30 miles to La Guayra; it is all along bounded by the base of the lofty wooded mountains of Caracas, and is so bold that a vessel may approach it and anchor, if necessary, at ½ mile distant, or even less.

The most remarkable mountain peaks on this part of the coast are the Pico Agudo de Carés, bearing W. by S. 29 miles from cape Codera, and about 10 miles inland; the Pico de Niguatar, 10 miles farther to the westward, 9,480 feet above the sea; the Silla de Caracas 8,500 feet high, about 4 miles to the northwest of the latter; and lastly Monte de Avila, which is about 3 miles SSE. from La Guayra.

Macuto is the name of a village on the shore of a small bay about 3 miles eastward of La Guayra; it is protected on the west side by a small fort. There is a good anchorage all over the bay, and the soundings are regular in approaching the watering place. The depth is 20 fathoms at about ¾ of a mile from the shore, with a street of the villege, close by the watering place, open or end on, and the eastern entrance point a little open of the point westward of it.

In standing in towards the village, keep the watering place in line with the northwest corner of the chapel, and the highest cocoanut tree over the east angle of the fort.

Wood and water.—This is a convenient place for obtaining wood and water, the latter being conveyed to the beach through iron pipes.

La Guayra, the port of entry of Caracas, is situated at the foot of the mountains, on a narrow and uneven plain between two huge masses of rock. It has been well fortified, but some of the principal fortifications have been removed for the purpose of carrying on improvements in the town.

The principal exports of Venezuela from La Guayra are cocoa, coffee, and hides; large quantities of dye wood and medicinal roots might be procured, minerals are abundant, and coal has been worked in two or three places within a convenient distance of the sea.

To the eastward of La Guayra, within a distance of 10 miles, may be seen the chimneys of several sugar manufactories, by which the approach to the anchorage may also be identified.

Supplies.—Fresh beef is plentiful, and of good qualtity; other meats are scarce. There is a moderate supply of fruits and vegetables.

Water of good quality can be procured from a reservoir about 500 feet above the level of the sea, in the bed of a small river; the casks

have to be landed at the wharf, rolled to a short distance, and filled at a fountain; or they may be filled in the boat by means of a hose.

Wood can be procured.

Coal.—There is no coal depot at La Guayra, and vessels must not expect to obtain more than 40 tons. The price, including lighterage, is about $25 per ton.

Mails.—Seven lines of mail steam vessels call at La Guayra.

Anchorage.—The anchorage at La Guayra is merely an open roadstead in front of the town, exposed from E., through north, to W., and is generally considered safe except in the season of rollers. In the year 1821, out of 20 vessels, 19 were forced from their anchors and wrecked, the only one saved being an American frigate which parted from four anchors; it is stated, however, that they all snapped their cables, which would show that the holding ground is excellent; still, some authorities assert that there are places where even in strong sea breezes the anchors will come home.

The usual position for anchorage is with the NE. bastion of the town bearing E. by S., about ½ mile distant, in 7 to 10 fathoms. The sea breeze generally fails about 7 p. m., when a calm succeeds and sometimes a breeze sets in from the westward, which renders it necessary to lay out a kedge in that direction ready to swing to. A good berth will be found in 10 fathoms with the cathedral in line with a large archway on the sea wall bearing about SE. by S.

There is no danger near the shore, and 3 fathoms water will be found within 200 yards of it; a heavy surf rolls in upon the coast, and landing is frequently impeded for several days together.

If intending to water, it will be more convenient to take up a temporary anchorage off the watering place in 5 or 6 fathoms, at a short distance from the shore.

Directions for La Guayra.—Approaching the anchorage off La Guayra, the cathedral tower, which is *white* with a clock in it, will be the most prominent object. There is also a *white* church nearer the water; these in line will lead into the anchorage. It will be better, however, to bring the cathedral tower well open to the southward of the *white* church, on a SE. by E. bearing, to insure an anchorage in reasonable depth.

It is advisable for a vessel bound to La Guayra, under sail, to keep well to the westward, for should the wind fail, anchorage will be found westward of the port, but not to the eastward.

Caracas, the capital of the province, and the seat of government of the Republic of Venezuela, is situated at the west end of the plain of Chacao, 2,880 feet above the level of the sea; it is 7 miles from the coast in a direct line, but the carriage road to it is 21 miles long, and the bridle road over the mountains 12 miles.

Coast.—The coast from La Guayra trends about west for 6 miles to Pedrera point, and from thence SW. 4 miles to Arrecine point, when it takes a W. by S. direction 17 miles to Puerto de la Cruz. The shore about cape Blanco, which is a short distance eastward of Pedrera point, has a gray and rugged appearance, and at about 4 miles off looks like a town standing under the high land. Cape Blanco is a small conical sand hill, partly covered with brushwood, easily recognized from a distance, and forming a good mark of recognition for vessels approaching La Guayra from the westward. From Pedrera point to Arrecine point and on to Oricaro point the shore is foul; but from thence to Cruz point it may be coasted within a mile. From Puerto de la Cruz the coast continues on the same line of bearing, for 23 miles, to Cata bay; it is all very clear and may be approached with safety to the distance of a mile or less. From La Guayra to Puerto Cabello a narrow ridge of mountains lies parallel with the shore at the distance of about 6 miles inland. Mount Palmar, 16 miles westward of La Guayra, rises to the height of 6,373 feet; and mount Tamaya, south of Cruz point, is elevated 3,973 feet above the sea.

Puerto de la Cruz is merely a small indentation or cove about 300 yards wide and 400 yards deep; the shore all round is so steep that at a short distance from it there are 4½ fathoms. A rock lies close to its eastern entrance point, and a small river flows into the head of the cove. The anchorage is good, but, being so confined, it is only fit for small vessels.

Province of Carabobo.—About 8 miles eastward of Cata bay is a small projecting headland named Morro Choroni, and a mile westward of the morro is Aroa point. Aroa point forms the northeast limit of the province of Carabobo, the northern boundary of which extends westward to the river Yazacui, a distance of about 40 miles.

Cata bay is ½ mile wide at the entrance and about ½ mile deep. Close to its eastern entrance point there is an islet, and from this point the shore trends southward to the inner part of the bay, where a river empties into it, throwing up a shallow bank, which extends almost 200 yards from the shore. Every other part of the bay is clear, with 25 fathoms in the middle to 4½ fathoms at about 300 yards from the beach.

On the east side of the bay there is a lookout station, and it is further recognized by mount Meseta, a remarkable table mountain 3,715 feet high, situated about 6 miles eastward of it, and 5 miles inland; and also by mount Ocumare, 700 feet above the sea, which rises at about the same distance south of the bay.

Supplies.—Water and wood may be obtained in Cata bay, and fresh meats and vegetables from a small town about 4 miles distant.

Ocumare bay.—At ⅔ of a mile westward of Cata bay is the eastern entrance point of Ocumare bay, in which there is good anchorage, but confined, for it has many banks in it, and becomes narrow to the southward. An islet lies about 100 yards northwest of the east entrance point, and in the channel between it and the point there are not less than 6 fathoms.

In taking up an anchorage in this bay a vessel must haul in close round the west side of this islet, and be prepared to anchor quickly, as soon as shelter is obtained, in 6 or 6½ fathoms over sand, about 200 yards or a little more to the southward of it. Great care must be taken to stop the headway in time, for, by shooting farther in, there is danger of grounding.

A river empties into the bay to the southward of this islet, having on its banks a few fishermen's huts; at a short distance inland is the commercial town of Ocumare.

Cienaga de Ocumare is the name given to a bay or opening, the east entrance point of which is 2 miles westward of the islet in Ocumare bay; the west point is formed by an isolated morro that rises on the low land. The opening is skirted by a broken reef, through which there is a channel carrying 12 to 4½ fathoms water, leading into an anchorage; it is very indifferent, however, and only fit for small coasters.

Port Turiamo.—From the Morro of Cienaga the shore trends westerly 1½ miles to the east entrance point of the harbor or inlet of Turiamo, 200 yards from which lies a small islet that is high, bold, and steep-to. The harbor affords excellent anchorage, and is capable of receiving vessels of any class. It is about 1 mile wide at the entrance, decreasing inwards to ¾ of a mile, and is about 2 miles deep from north to south. All its sides are fringed with a coral ledge to the distance of about 100 yards; so that by not approaching nearer all danger will be avoided. The general depth in mid-channel is from 25 to 18 fathoms, on sand and mud. The river Turiamo forces its way through the sandy beach which forms the inner shore of the inlet.

Outlying cays.—From port Turiamo the shore trends westerly and northwest for about 9 miles to Brava point, at the entrance of Puerto Cabello. Abreast the bight, where the shore alters its direction, is situated Cay Largo or Long islet, which is about 1 mile in extent ESE. and WNW., and its southwest end lies about 1 mile from the shore. At ½ mile WNW. of Cay Largo is Santo Domingo or Middle islet; and at ¾ of a mile farther to the northwest is Alcatraz islet; these are each only about 600 yards in extent. They are all wooded; and Cay Largo may be seen when 18 or 20 miles to the eastward of it. Reefs surround these islands, but none of them appear to extend off more than ⅛ of a mile.

About ¼ of a mile south from the southwest extreme of Cay Largo

there is a small dangerous shoal; but, with this exception, the channels between the cays are said to be quite clear, and may be freely navigated.

At ⅜ of a mile SSW. from the western extremity of Santo Domingo island and about ¼ of a mile from the mainland is Ratones island, which is about 200 yards long NNE. and SSW., and is skirted by a reef of small extent.

Anchorage.—Between Cay Largo and the main there is excellent anchorage in 10 or 12 fathoms, with the southwest point of the cay bearing NNW., and the Trench bastion, which stands on a hill above Puerto Cabello, bearing WSW.

Wood and water.—This is a convenient anchorage for obtaining wood; and water may be procured from Borburata river on the main to the southwest. As the mouth of the stream shifts, the best way will be to anchor the boats off it, steadying them with a line to the shore, and fill the casks in them from breakers. To water, it would be more convenient to take up an anchorage in 10 or 11 fathoms at about ½ mile NNE. of the river, midway between it and the southwest extreme of Cay Largo.

Borburata harbor.—At about 1½ miles eastward of Brava point there is a small snug inlet, about ⅓ of a mile deep, and nearly 400 yards wide, with depths of 9 to 6 fathoms almost alongside the beach and at its head, called Borburata harbor; the other sides are skirted by a coral ledge to a short distance, leaving a channel in the middle about 200 yards wide. As it lies NW. and SE., it has the advantage of allowing a vessel to sail in and out, with the usual trade-wind; and, being to windward of the swamps of Puerto Cabello, is a more healthy temporary anchorage for a small steam or handy vessel than off the city.

From the western entrance point of Borburata harbor the coast trends WNW. ⅜ of a mile to point la Costica.

Kings island.—A small wooded island about 500 yards in length WNW. and ESE. lies about ⅓ of a mile NE. of point la Costica, and is skirted by a reef of about ⅛ of a mile in extent.

Coast.—From point la Costica the coast trends westerly to point Brava, a distance of ¾ of a mile. This part of the coast is foul, and in rounding point Brava do not approach it nearer than ¼ of a mile.

From point Brava, the coast takes an irregular SSW. direction for a distance of nearly ½ mile, to Fort Libertador or St. Philip's castle, and may be freely navigated to within less than ¼ of a mile. In rounding fort Libertador, to enter the port, it should be given a berth of about 150 yards.

Puerto Cabello may be described as a lagoon about a mile in length and the same in breadth, bounded on the north and west by a line of narrow, low, sandy islands, the interior to the east and south being

nearly filled with swampy mangrove cays, between which are several veins of deep water. The entrance lies nearly in the middle of the west side, forming a channel nearly ½ mile in length, leading into a small basin on the north side of the lagoon, named Great bay, where vessels of large draught formerly could lie secure in 5 to 7 fathoms; the channel, however, is so narrow that only one vessel can pass in at a time, and as it lies east and west, she must steam in or be warped.

Great bay is not now used as an anchorage, owing chiefly to its having no wharves or facilities for communicating with the town, and also from its unhealthiness. The fairway to the bay is, therefore, not kept open, but vessels are moored head and stern in all parts of the channel. Vessels are not allowed to enter the harbor until visited by the port authorities under penalty of a heavy fine.

The town is situated on the south side of the entrance, and is strongly fortified. On the north side of the entrance stands fort Libertador, formerly known as St. Philip's castle, which is rapidly falling into decay; and the entrance to the bay is further protected by a fort on Brava point. On a hill at the back of the town there is also a fort built of white stone, which may be seen from a distance of 10 miles.

Puerto Cabello is the port of entry of the province of Carabobo, and is situated north, about 20 miles, from Valencia, the capital. It affords every resource required by shipping, and vessels meeting with accidents will find every means for making them good, with the convenience of being able to lie alongside piers at the entrance in complete security; in fact, it is the only harbor in Venezuela with these advantages. It is to be observed, however, that lying so low and immediately to leeward of pestilential swamps, it is exceedingly unhealthy, and, therefore, by no means so desirable a place for this purpose as Sta. Ana, at Curaçoa.

At 1¾ miles west from Brava point there is a small, low, wooded islet about ¼ of a mile long, north and south, named Guaiguaza, lying about 600 yards from the shore, with a depth of 8 fathoms in the channel between. At 400 yards northward of the north point of the islet lies a dangerous patch of coral, named Larne shoal, about 200 yards in extent, with 3 fathoms water over it, which breaks in strong breezes; its outer edge bears W. by N. ¼ N. from the center of fort Brava.

Anchorage.—The bay between Brava point and Larne shoal is quite clear, and good anchorage may be taken up as most convenient in 10 to 12 fathoms, sand and muddy bottom.

Coal and supplies.—The facilities for provisioning, watering, and coaling ship are poor. The only coal kept here belongs to the Venezuelan government, and is bituminous. Provisions are enormously high. Water, for which there is no charge, may be obtained from a fountain on the wharf, but there are no means of getting it off, except by a vessel's own boats. Water can also be obtained at the mouth of the

river St. Stephen, but would seem to be undesirable in quality, on account of the uses made of the stream by bathers and washerwomen.

Light.—A *revolving* light, visible 14 miles, exhibiting alternate *red* and *white* flashes every 40 seconds, is shown from a quadrangular tower in fort Brava at an elevation of 79 feet.

Bank.—A large bank is said to lie about 10 miles northward of Puerto Cabello, on which a depth of 8 fathoms has been found, and much less is suspected.

Gulf of Triste.—From Puerto Cabello the shore curves round to the west and northwest, for about 28 miles, to Tucacas, forming the gulf of Triste; it is everywhere low and sandy, and backed by mangroves; the land in the interior, although high, is less elevated than it is to the eastward, and a few miles to the westward of Puerto Cabello slopes gradually to the sea. The coast, as far as the river Aroa, is clear, but, as a heavy swell rolls in and the surf breaks violently on the beach, it will be better not to navigate it within less than 1½ miles or within the depth of 15 fathoms.

Yazacui and Aroa rivers.—About 16 miles, WNW., from Brava point is the entrance to the river Yazacui, which forms the boundary between the provinces of Carabobo and Coro; and NNW. 5 miles from thence is the entrance of Aroa river, where there is a village of about 200 huts.

The Aroa has become of importance from its being the means of transporting the produce of the copper mines lying about 60 miles in the interior, the ore of which being brought to the banks, according to the state of the river, is conveyed to the mouth in flat iron canoes, drawing about 14 inches water, and taken from thence in coasters to the depot at Tucacas, for more convenient shipment.

From the Aroa the shore trends more northerly to Tucacas, 6 miles distant, and here the sandy beach terminates.

Outlying islets.—Fronting the northern part of the gulf of Triste are three small low mangrove cays with swamps in their center, occupying a space about 4 miles in length NE. and SW.

Cayo del Sur, about 400 yards long, lies NE. 4 miles from the entrance of the Aroa. From its southwest extreme a reef, in many places dry, extends ¼ of a mile and is steep-to; there are 7 fathoms at 100 yards and 10 fathoms at 200 yards from the southwest end; on the southeast side there are 6 fathoms close to. From the northeast extreme of the cay a coral ledge with 2 to 3 fathoms water extends out ¼ of a mile. The northwest side forms a sandy beach, skirted by rocks, which makes landing difficult; but there are 7 fathoms at the distance of only 100 yards from the shore.

The channel between Cayo del Sur and the main is quite clear and has 15 fathoms in the middle.

Cayo del Medio is about ⅛ of a mile in length, and lies NE. ¾ N. about ¾ of a mile from Cayo del Sur. It is steep-to on all sides but the northeast, from whence a reef projects out ¼ of a mile, where it terminates in 4 fathoms. In the center of the channel, between this cay and Cayo del Sur, there is a bank of 3 fathoms water about ¼ of a mile in extent, leaving a passage on both sides of it 200 yards wide with a depth of 12 fathoms.

In passing through, it will be safer to pass northward of this bank and within 100 yards or less of Cayo del Medio, for there are 7 fathoms within a ship's length of the latter. Great risk will be incurred by taking Cayo del Sur side.

Cayo del Norte lies NE. ⅛ E. 2½ miles from Cayo del Medio, S. ½ E. 6 miles from Tucacas point, and E. ½ S. 5 miles from Brava point. This cay is about ½ mile in length, and steep-to on all sides but the northeast, from whence a ledge with 2 to 3 fathoms water on it, and 7 fathoms at ¼ of a mile outside, extends half a mile. There are 16 fathoms within 200 yards of the southeast side of the cay; 7 fathoms close to the southwest extreme, and 11 fathoms ¼ of a mile from the northwest side.

The channel between Cayo del Norte and Cayo del Medio is quite clear, with the exception of the ledge off the northeast end of the latter; and it is by far the best to navigate, either from the eastward or westward.

Cayo del Norte bank.—About 2 miles northward of Cayo del Norte there is a coral bank which shoals suddenly from 24 to 6 fathoms; it appears to trend about NNW. ½ W. towards Tucacas point, and is reported to be of considerable extent.

Anchorage.—The soundings between these cays and the main, from the Aroa to Tucacas, are very regular, decreasing from 16 to 3 fathoms within ¾ of a mile of the beach, this space affording good anchorage anywhere; the best shelter will of course be under the west sides of the cays, leaving room, however, to veer or weigh with the land breeze, which sometimes blows freshly.

Tucacas is a village of about 200 huts, besides a few large wooden houses belonging to the officers of the mining company, and stands on the west point of entrance to an extensive lagoon in the north part of the gulf of Triste; unfortunately it does not afford good water, and the inhabitants are consequently obliged to obtain it from the river Aroa. A mud flat extends SSE. about 400 yards from the wharf on the east side of the town, and between it and the cays to the eastward there is a narrow channel carrying 7 feet water, but it requires a pilot.

A railroad is in course of construction between Tucacas and the Quebrada copper mines.

The shore for the space of about 6 miles to the eastward of Tucacas, as far as Tucacas point, is fringed with wooded cays, their outer sides

being skirted by low coral points and shallow ledges, leaving small channels leading into extensive lagoons navigable for boats. The southernmost and largest of these cays is named Brava island.

Buoys.—A coral reef stretches to the eastward 400 yards from Brava point, and near the extremity are some rocks above water, with 6 fathoms within less than 200 yards from them. To the westward of the point a ledge extends WSW. about 200 yards, and then curves round to the northwest 200 yards; on the extremity of the elbow, in 5 fathoms water, there is a buoy with a staff and vane; and on the northwest extreme of the reef, in 3½ fathoms, there is a black buoy.

Brava cove.—Westward of Brava point the shore sweeps round to the northwest, forming a small, snug, sandy cove, at the northwest end of which stands a large white building, known as the Ore house, with a wharf in front, which will allow a vessel drawing 16 feet to lie alongside and load; the end of the wharf lies N., 120 yards, from the black buoy; and between it and the buoy the depths are from 18 to 24 feet From the west side of the wharf a reef extends along the south side of Brava island, having 6 feet on its outer edge at 100 yards from the shore; there is also a coral shoal of 9 feet water, 200 yards in extent, from the north edge of which the Ore house bears ENE. distant ¼ of a mile; there are 5 fathoms 200 yards to the southward of it.

Anchorage.—There is a good outer anchorage with the Ore house bearing N. by W., about ⅓ of a mile distant, in 5½ fathoms, and a vessel should not approach nearer the shore, to the westward of this, than a depth of 5 fathoms, to avoid some coral heads in that direction.

Directions for the gulf of Triste.—Vessels approaching the gulf of Triste from the eastward, or from Puerto Cabello, will observe from off the latter place, in clear weather, a remarkable gap in the eastern part of the mountain ridge, which commences to rise a short distance to the westward of Tucacas point; and on the south side of the gap, on the face of the hill, will be seen some white cliffs; the gap bears NW. ¼ W. from Puerto Cabello, NW. ½ N. from Cayo del Sur, and WNW. from Cayo del Norte.

As already stated, the widest and safest channel is between Cayo del Norte and Cayo del Medio, and the remarkable gap on about a NW. ¾ W. bearing will lead a vessel up to it. Having passed through, within about ½ mile of the former cay, the village of Tucacas and the Ore house will come in sight from the masthead, bearing WNW. ¼ W., and this latter course will lead to the outer anchorage of Brava cove. All that is necessary to observe is that the soundings decrease suddenly when near Brava point, and preparation must be made to bring up quickly. A convenient berth will be found with the Ore house bearing N. or N. by W., about ½ mile distant, or if necessary, and no vessel be in the way, farther in, just inside the black buoy, ready to warp up to the jetty.

When approaching from the northward, and being uncertain if the cays seen are those off Chichirivichi, or those off the gulf of Triste, a course should be steered to keep 2 or 3 miles outside all of them, until the position is made out by means of the gap, when the above directions may be followed.

In leaving Tucacas, vessels often have to work out, and in this case it will be better to move out on the previous afternoon and anchor for the night near the cays.

Puerto Cabello may sometimes be fetched from the south channel, but it will generally be better to proceed out through the passage between Cayo del Norte and Cayo del Medio.

Winds.—The winds that prevail in the gulf of Triste are alternate sea and land breezes, the former setting in from the northward, and veering to SE., the latter blowing off from S. to WSW. The times of these changes vary daily, and cannot be depended upon; generally the sea breeze commences at 10 a. m. and lasts till sunset, when the wind falls, sometimes to a calm, the land wind coming off about 10 p. m. and continuing till 8 a. m.; it frequently happens, however, that the sea breeze blows all night.

Currents.—The current when setting to the westward in the offing, which is usually the case, is, by the formation of the gulf of Triste, forced out to the northward, between the cays and the main; therefore if, from the strength of the sea breeze or other causes, it is suspected to be running strongly in that direction, it will be better for a vessel bound to Puerto Cabello, or to windward, to work up to Cayo del Norte before stretching across.

Tides.—The tide rises about 3 feet in Brava cove, but the time of high water is uncertain.

Tucacas point bears about NE., 5 miles, from Brava point; no distinct point, however, appears, for between Brava island and Chichirivichi, the shore gradually curves round to the north and northwest, for 8 miles. This projection is low, and cut up by mangrove swamps, for about a mile inland, when it commences to rise, and about 20 miles to the westward mount Mission reaches the height of 2,358 feet.

The shore of Tucacas point is foul, and not far from it lie some cays, the southernmost of which are known as the Pescadores.

The northernmost, named Sombrero, is about 1 mile in length NW. and SE., and between it and the main there is a channel barely ½ mile wide, carrying 11 fathoms, but it is dangerous from the reefs and shoals that skirt the mainland to leeward. Off the northeast side of Sombrero, there is also a cay, surrounded to the distance of 400 yards by a reef, which should be given a berth of 1 mile.

From abreast the north end of cay Sombrero to Chichirivichi, a distance of about 3 miles in a northwest direction, the shore is still low and bordered by a reef ½ mile broad.

Port Chichirivichi is a small, narrow, tortuous inlet, with low mangrove shores, about 2 miles in length, with depths of from 4 to 6 fathoms. The entrance is obstructed by small cays, leaving a channel about 400 yards wide, open to the northeast, and therefore difficult for a sailing vessel to get out of, except with the land wind. A short distance within the entrance it opens out to ½ mile in width, and affords good anchorage. The eastern side of the port is formed by a neck of swampy land about a mile long, the northern part of which, named Chichirivichi point, is bordered by a reef which extends about ½ mile, and on which there are several small islets or rocks.

Peraza cay, the easternmost and smallest of the islets at the entrance of port Chichirivichi, is foul all around except on the southeast side. On the north and west sides the reef extends about 200 yards, leaving a channel a little more than 200 yards wide between it and the reef off Chichirivichi point, carrying 7 fathoms.

Chichirivichi cay, lying 400 yards westward of Peraza cay, is also fringed with a reef, which extends from the north point about 400 yards. The channel between it and Peraza cay is about 200 yards wide, and has 6 to 7 fathoms water. Between it and the northwest entrance point of the port, near the main, is a shoal of 1¾ fathoms, which contracts the channel between it and the cay to a width of about 600 yards, carrying from 5 to 7 fathoms. Another shoal of 1¾ fathoms, 200 yards SW. by S. of this, about 500 yards in length, lies parallel with the coast. There is also a shoal 300 yards to the eastward of the latter, the depth upon which is not known.

Sal cay, so named from having a salt pond in the center, is situated ⅓ of a mile northward of Chichirivichi cay, and the depths between them are 6 and 9 fathoms. The cay is about ¾ of a mile in length, NW. and SE., and is also skirted by a coral ledge which runs off nearly 200 yards, except on the southwest side, where it is steep-to.

Borracho, the northern of these cays, bearing N. by E., 1½ miles, from cay Sal, is small and also very foul, with reefs extending ½ mile from its northeast and south extremes.

The soundings around these cays are very regular; there are 6½ fathoms about ½ mile from the coast, which depth continues to 2½ miles northward of Borracho, where there are 14 fathoms on sandy mud.

Directions for port Chichirivichi.—To enter port Chichirivichi from the eastward, keep in mid-channel south of Peraza cay until cay Sal is open to the westward of cay Chichirivichi, when haul gradually round to the southward, anchoring as soon as shelter is obtained.

Tucuyo river.—From Chichirivichi the coast trends NW. by N. 18 miles to San Juan point. About midway is the entrance of the river Tucuyo, the largest river in Venezuela; its length is said to be 330 miles and it is navigable for canoes more than 150.

La Piragua shoal.—About 5 miles northward of the Tucuyo, and 4½ miles from San Juan point, is a small shoal named Piragua, which lies about a mile off a point named Manatie, under the Cerro del Manglar.

Elsewhere in this vicinity the soundings are regular, and the depth is 14 fathoms at 4 miles from the land.

San Juan bay, formed on the west side of San Juan point, is about 2 miles in extent, sheltered from the E. and NE., but it is so shallow that at ¾ of a mile from the beach the depth is not more than 3½ fathoms. A reef extends 400 yards from San Juan point, and at ½ mile from the point is San Juan cay, which is fringed with a reef. NW., 2¾ miles, from San Juan point, there is another islet, about ½ mile long, known as Northwest cay, which is very foul on all sides. A reef extends from from it to the SE. about ¼ of a mile, upon which are several small dry rocks and cays, leaving a clear opening 1¼ miles wide between it and San Juan cay.

The anchorage for small vessels in this bay is southwest of San Juan cay. If of large draught, a vessel should pass outside Northwest cay, at the distance of at least ¼ of a mile; the channel between San Juan cay and the point is only navigable for small vessels.

Coast.—The coast from San Juan point takes a NW. by W. direction, about 19 miles, to Ubero point, the whole space being clear and the soundings regular; but about 8 miles from the former point there is a small rock, named the Farallon del Soldado, lying close to a cliffy part of the shore. Abreast this rock, about 7 miles inland, the Cerro de Capadare rises to the height of 1,620 feet.

Ubero bay, formed on the west side of Ubero point, is very shallow, and scarcely affords shelter from the trade wind for large vessels. About NNW., 1½ miles, from this point, there is a bank over which the least depth is 4½ fathoms.

Coast.—The coast from Ubero point to that of Zamuro trends NW. by W., 12 miles, and from the latter to Manzanillo point, with a few slight curves of no importance, W. ¾ N., 25 miles. All this part is clear, and may be safely navigated, by proper attention to the lead, to within the distance of 1½ miles.

In the interior, and also near the coast, are several mountains which may be seen from a long distance; and SW., only 6 miles inland from Manzanillo point, the Cerro de Cumarebo rises nearly 2,000 feet above the sea.

Cumarebo bay.—From Manzanillo point the shore trends to the southwest for about 6 miles, when it forms a small sandy beach, known as the bay of Cumarebo; and SE. 3 miles from it, on the side of the hill, is the small town of that name.

Vessels may lie close under the lee of the land at Cumarebo, but there is very little trade.

Light.—A harbor light, consisting of a lantern on a wooden column, is occasionally shown at Cumarebo, for private purposes.

From Cumarebo beach the shore takes a westerly direction, for 10 miles, to Carricito point, and then curves round to the southwest for about 3 miles to Frayles point.

Cumarebo bank.—At 7¾ miles WNW. from Manzanillo point, lies a small rocky bank with 5½ fathoms water over it, and 11 to 18 fathoms close to.

Vela de Coro bay, on the west side of Frayles point, has anchorage in 4 to 6 fathoms, and may be entered by the lead, for there is no danger. At the southeast side of the bay stands the town of Vela de Coro, consisting of a few stone houses, among which the custom-house on the beach can be well distinguished. The river Coro empties into the sea about 1½ miles to the westward of the town, and about 2 miles inland, to the eastward of the town, is an Indian village named Carrizal. With a moderate breeze there is a high sea in Vela de Coro bay.

Light.—A small *white* harbor light is shown at Vela de Coro.

Isthmus of Medanos.—From the river Coro the direction of the shore turns abruptly to NW., and forms a ridge of low sand-hills, about 19 miles in length and 3 miles in breadth, interrupted by some swamps and small lagoons, uniting Paraguaná peninsula to the main land.

Sta. Ana de Coro.—At the inner end of this isthmus, and on its western side, about 5 miles to the westward of the river Coro, is the city of Sta. Ana de Coro, the capital of the province, which stands on an arid plain, 2 miles from the sea, and 100 feet above its level.

Paraguaná peninsula is 32 miles in extent from north to south, and about 28 miles from east to west. The center is occupied by a lofty, rocky, mountainous mass, and about 10 miles from the southeast end of the peninsula the Pan de Sta. Ana rises to the height of 1,302 feet, and may be seen from a distance of 30 miles; from thence an irregular ridge of hills extends to the northward, terminating abruptly at cape San Roman. The shores at the base of the mountain, both to the east and west, are low and level; on the west side there are numerous cultivated salt ponds, but the land is swampy and often overflowed.

The east coast of the peninsula, from the isthmus, trends N. ½ W., 15 miles, and from thence sweeps round to the northwest, about 20 miles, to cape San Roman, the northern extremity of the peninsula, which is high, bold, and faced with red cliffs; the shore is all along foul to a short distance, but the soundings off it are deep, and at 10 miles there are 18 to 32 fathoms.

Cape San Roman bears SSW. ¾ W. 15 miles from the southeastern extremity of Oruba island; there is no danger between, and in the middle of the channel there are 55 fathoms. The extremity of Oruba

island is low, but steep-to at the distance of 400 yards. The current generally runs here strong to the westward.

The west coast of the peninsula, from cape San Roman, trends SW. by W., 13 miles, to Macolla point, and is all along very low. Macolla point is formed by a low projection of sand which extends from the coast, and is about 2 miles broad, being conspicuous from a distance by the mangroves growing upon it; the northeastern extremity of this projection is named Medano point, the southwestern Bergantin point. East of Macolla point there is an anchorage known as Macamba cove. From Macolla point to Cardon point, the southwest extreme of the peninsula, the shore trends in a southerly direction for 30 miles, with a slight outward curve.

Emulous shoal.—H.M.S. *Emulous*, in 1815, when standing towards the shore, with cape San Roman bearing ENE. ½ E., distant about 12 miles, and off-shore about 3 miles, was reported to have passed near a shoal on which the water broke, having 15 fathoms close to. To the eastward of this, towards the cape, the soundings are regular, and there is anchorage all along, every danger being visible in the daytime. On the position assigned to the Emulous shoal, 17 fathoms of water were found by the U. S. S. *Huron*, in 1877, with no breakers in sight, although four or five white caps in line, sometimes had that appearance.

Salinas point.—From Macolla point the coast trends SSW., for 12 miles, to Cucuy point, and then S., for 3 miles, to Salinas point, a white sandy spit, on which are some remarkable round trees and, generally, heaps of salt.

Salinas bank, on which are some detached rocks, extends 2½ miles from the coast in the vicinity of Salinas point; it is steep-to on the southern side.

Estanques or Taques point.—This point lies about 3 miles south of Salinas point, and forms the southern* entrance point of Estanques bay; it is a long sandy point, with some huts on it, and houses situated on the cliffs above it.

Estanques bay.—The Pan of Sta. Ana bearing E. ¼ N. will lead from seaward to Estanques bay, where there is good anchorage in 3 to 10 fathoms about ½ mile from the shore. A vessel may go so far in as to bring Salinas point to bear NNW. ½ W., and Estanques point S. ½ E., in 4½ fathoms, about 400 yards off shore. This place is frequented by fishermen, who in the season take immense quantities of fish by the seine.

Vessels merely communicating with Maracaibo, with the probability of having to remain some time, will find this a more convenient anchor-

* Commander Ryan, U. S. N., remarked, in 1877, that the bight between Salinas and Estanques points should not be entered; all other authorities make Estanques point the *southern entrance point* of Estanques bay.

age than the heavy riding off the entrance of the lake; and those of too great draught to cross the bar usually receive their cargoes here from lighters, but no vessel is allowed to discharge cargo.

Good water may be procured here, and supplies of provisions.

Amoay bay.—At 3½ miles south of Estanques point is situated Amoay point, between which and Morro de Amoay (a hill of moderate height, 1 mile south of it) good anchorage will be found. Upon Amoay point are some houses, north of which a steep stony bank extends 400 yards from the shore.

South of Morro de Amoay an extensive bay is formed, which should not be entered without a pilot; off Adaro point, the south entrance point of this bay, there is an islet, the western part of which is cliffy.

Guarano cove.—This indentation is situated 4 miles south of Adaro point, the coast between being free from dangers. Heavy squalls are experienced at this anchorage, and vessels generally secure with hawsers to the shore. Near Guarano cove are situated extensive salt works.

Cardon point.—This point, forming the southwest extreme of Paraguaná peninsula, lies 5 miles south of Guarano cove; it is a long sandy spit, steep-to on the northern side, but gradually shelving on the southern side.

A bank is situated about 2 miles SE. ½ S. from Cardon point.

In running down the western side of the peninsula vessels should not go inside of the 6-fathom line, as banks make off all along the shore.

Gulf of Venezuela or Maracaibo.—Between Macolla point on the east and Espada point on the west, the entrance to the gulf of Maracaibo is 48 miles wide, and its depth to the head of Calabozo bay at its southwestern extremity is upwards of 100 miles.

The gulf of Coro, at the southeast part of the gulf of Maracaibo, is shallow and little known, being seldom visited; the trade of the city of Coro being carried on chiefly by way of the bay of Vela de Coro; vessels proceeding to Maracaibo should not pass eastward of the meridian of Cardon point.

South side.—The south side of the gulf of Maracaibo, from the head of the gulf of Coro to the head of Calabozo bay, trends westerly upwards of 150 miles; it is all along very low, and to the eastward of the Laguna de Maracaibo, sandy, with reddish cliffs rising above it, and numerous small streams flowing into the sea. The principal of these is the river Palmar, which reaches the bay of Oribano about 20 miles to the eastward of the entrance to the Laguna, forming the boundary of the provinces of Coro and Maracaibo. The high lands of the interior, however, are visible at a long distance, and south about 15 miles from Coro, the Cerro de la Teta rises to an elevation of 4,110 feet. This great mountain ridge declines in height as it approaches the Laguna, and from the sea it appears to terminate about 20 miles to the eastward of it.

In the vicinity of Borojo point, 55 miles eastward of Bajo Seco island, are several high sand hills; in clear weather Empelados hills, in the interior, are visible from this neighborhood.

Zapara island.—Immediately westward of the river Palmar, the coast is fronted by low mangrove islands, forming the shore of the delta of the Laguna de Maracaibo, and for a distance of 20 miles westward of the Palmar, the coast is known as Zapara island. The channel into the Laguna is near the west end of this island, and was formerly defended by a castle now seen in ruins, on that point; this extreme of Zapara island is also pointed out by the mangroves being much higher than elsewhere.

Light-house.*—The ruins of a light-house are situated near the west end of Zapara island.

Bank.—At 3 miles N. by W. from the east extreme of Zapara island is situated a stony bank, which uncovers at low water and breaks heavily.

Bajo Seco island is the name given to a small sandy cay about 2 miles westward of Zapara island. From Zapara and this island a shallow sand-bank stretches off to seaward from 2 to 3 miles, and breaks heavily on all parts, except at the entrance of the bar channel.

San Carlos island extends about 20 miles in length; on the southeast extreme is situated a conspicuous white fort and the houses of the pilots.

Eastward of San Carlos island are situated the islands of Pajaros and Pescadera, and southward of it the conspicuous island of Todos, or Toas.

Maracaibo, the capital of the province, is situated on the western shore of the Laguna de Maracaibo, about 20 miles from the entrance, on the north side of an inlet about 2 miles in length, which forms a good harbor. It is a place of considerable trade, from whence is exported the products of the interior, which are brought to it from the rivers flowing into the Laguna.

Bar.—The channel from seaward into the Laguna de Maracaibo is subject to changes both in position and depth; in 1875 the entrance was situated between Bajo Seco island and the west extreme of Zapara island, and was reported to carry a depth of 12 feet at high water, though vessels drawing more than 10½ feet were recommended not to attempt the passage.

In 1861 the bar was said to be dangerous, especially during and after bad weather; also that the channel westward of Bajo Seco island, formerly used, but discontinued on account of its having filled up, was

* This light-house is said to be rebuilding, and that it is intended to exhibit from it a *fixed white* light, visible 6 miles.

again found practicable—the steam vessel *Maracaibo* having passed out by it.. A bell-buoy is moored in 24 feet water near the west side of entrance to this channel.

The inner part of the channel lies between Zapara and San Carlos islands. Within this is the bar of Tablazo, which prevents vessels drawing more than 10 feet from getting up to the city even at high water.

The bar must not be approached at night. The best time for a boat to cross it is about 9 a. m., when the wind has moderated, and the sea is comparatively smooth, for during the strength of the breeze the surf breaks with great violence. Should a vessel unfortunately ground on the bar, which is of quicksand, she will be placed in imminent danger, as no dependence can be placed on anchors to heave off by.

Pilots.—It is against the law to attempt an entry without a pilot, the fine for doing so being $200. If proceeding to Maracaibo, the services of two pilots are required, the bar pilot being landed at San Carlos island; the service of a steam tug-boat can be obtained if required. Towage over the bar is one dollar per ton, on cargo. Every vessel must call at Puerto Cabello, outward, for clearance. On the pilot boat nearing the vessel, the latter must lower a boat to bring the pilot on board, without which she will not receive his assistance. A regulation makes it compulsory for the pilots to go out, if wind and tide will permit, when vessels are signaled.

Water can be procured from San Carlos island directly opposite the fort of Bajo Seco. The water in the Leguna becomes fresh about 10 miles within the bar. The seine may be drawn anywhere in the sandy bays, but alligators are numerous.

Coal.—A limited quantity of coal (150 to 200 tons) is usually kept on hand, and costs from $13 to $15 per ton. The coaling is done with lighters.

The west side of the gulf is bounded by the peninsula of Guajira, the interior of which is of considerable elevation. The Teta of Guajira, at the south end of the mountain ridge, about 15 miles inland, is 548 feet above the sea; the Sierra de Aceyte, towards the northern extremity of it, reaches the height of 2,812 feet. The side of the gulf being to leeward, and having no shelter, is seldom visited, and consequently but little known. It is said that it may be safely navigated in every part, by the lead, to within the depth of 6 or 5 fathoms; this information, however, must not be trusted to entirely, for the *Icarus*, having tacked in 4½ fathoms in standing out, struck in 2 fathoms, with Espada point bearing N. by E., distant 9 miles.

Several small anchorages known as Cojora, Cosinctas and Tucacas are situated on the northern part of this coast, but the approaches to them are obstructed by shoals. Espada point, the west entrance point of the gulf, is fringed with reefs.

Tides.—On the bar, at the entrance to the Leguna de Maracaibo, it is high water, full and change, at 5h. 15m., and the rise at springs is about 2½ feet. In the rainy season it is said to rise sometimes 4 feet. The ebb runs with great strength to the northeast.

Currents.—The outpour from the lagoon of Maracaibo enters the gulf with a velocity of 4 to 5 knots an hour, the eastern portion following the trend of the coast with diminishing velocity, to the gulf of Coro, and the western portion setting about NW.; westward of cape San Roman, there is generally a strong current setting to the NW.

Directions for the gulf of Maracaibo.—Vessels bound to the gulf of Maracaibo from the eastward, having rounded cape San Roman at the distance of about 5 miles, should steer to the westward until the Pan de Azucar on Oruba island, which may be seen 18 or 20 miles, bears NE. by N.; and taking this point for a departure steer SW. by S. This course will lead well to the westward of the suspicious ground off Macolla point, in sight of the Mesas of Borojo, which are some flat-topped hillocks or sand-hills, situated 55 miles eastward of the Leguna de Maracaibo; and into 7 fathoms, about 25 miles to windward of the bar. On reaching this depth a more westerly course must then be taken, running along the land at the distance of about 6 miles, guided by the lead, and taking care not to come into less than 6 or 5½ fathoms, to avoid the quicksands off the mouth of the delta. The water will occasionally be discolored in patches, but there is no danger, provided the above depth be maintained. On advancing westward, the first remarkable objects seen will be the two hills, 220 feet high, on the island of Todos or Toas, situated about 5 miles southward of San Carlos island, and visible from a distance of 20 miles; southward of them are three more small hillocks. When these latter bear SSW. ¾ W., about 13 miles distant, the white castle on the east end of San Carlos will be seen under them.

In approaching from Espada point, a course should be shaped about S. by W. to make the land well to windward; the soundings will gradually decrease from 15 to 7 fathoms, and the first land sighted will be the Toas hills.

It is not advisable to attempt to make the bar at the entrance to Maracaibo lagoon at night.

Anchorage.—The best anchorage, where to await a pilot, is in 5 fathoms, with Bajo Seco island bearing from S. ½ W. to SSW. ½ W., about 3 miles distant; or with Bajo Seco island and San Carlos castle in line, in about 6 fathoms. It is to be observed, however, that during the strength of the sea-breeze, from 4 p. m. to about 3 a. m., when it blows half a gale of wind, the riding is very heavy and requires good ground tackle; therefore, if it is only intended to communicate with the city of

Maracaibo, it will be better to remain under way, or proceed to the anchorage off Estanques, according to circumstances.

Winds.—In the gulf of Maracaibo during the dry season (January to July) strong NE. winds are generally experienced, veering, in June, to ESE. and SE., being then accompanied by squalls and rain.

During the wet season (August to December) northerly and NW. winds alternate with those from S. and SW. The northerly winds generally blow from noon until midnight, and the southerly winds from early morning until midday. Near the shore, during the dry season, strong breezes are experienced by day, and calms at night.

In working out of the gulf of Maracaibo, it should be borne in mind that, off shore, the wind generally shifts to the northward at 4 or 5 p. m.; therefore an effort should be made to get near the western shore about that time, so as to be able to make a long board to the eastward before the wind draws round in that direction. By paying attention to these changes a vessel will work out quickly.

In the early part of the year the winds from NNE. to NE. by E. are very heavy; and from 2 p. m. to 2 a. m. it blows a gale, with a heavy sea; yet, at about 8 a. m. the wind generally moderates.

Cape Chichibacao bears NW. by N. 13 miles from Espada point; in this space the coast is low, but everywhere clear, and may be safely approached by attention to the lead.

The boundary line which separates Venezuela from New Granada runs from cape Chichibacao through the middle of the peninsula of Guajira NE. and SW.

Los Monges (The Monks) is the name given to a group of small but rather high islets, lying off the entrance of the gulf of Maracaibo. The South Monks, (the two southernmost) which are close to each other, bear ENE. ½ E. 19 miles from cape Chichibacao, and are steep-to within 100 yards. At 3 miles NE. by E. from them, there is a single islet named the East Monk, which is equally bold, and there is no danger whatever in the space between. At about 8 miles NNW. ¾ W. from the East Monk, lies a group of seven rocks, known as the North Monks; these are all foul, and should be kept at the distance of at least a mile. The channels between them and the East and South Monks, and between the whole group and the main, are quite clear, and may be navigated without risk.

OFF-LYING ISLANDS.

Orchilla island, lying N. 72 miles from cape Codera, is about 7½ miles long east and west, and 1 mile broad; the western extremity terminates in a point, WNW., 300 yards, from which there is a rock (Farallon) 10 feet high, steep-to, with a clear safe channel between. The island is generally low and flat, but on the north side are several hills, separated by low valleys, the highest of which is Mt. Walker, near

the west extreme; they may be seen when 15 miles off, and when first sighted from the northward, appear as islands.

When approaching from the southward Orchilla appears like four or five small islands, but on nearing it the low land is seen, and a low point extending to the eastward.

Cays.—Close off the northeast extreme of the island there is a group of long narrow cays. Mosquito cay lies parallel with the shore of the island, from which it is separated by a strait of about ¼ of a mile in width; it is 2½ miles in length, east and west, and at its eastern end is ⅓ of a mile wide. Northeast cay extends from off the eastern end of Mosquito cay, to north and northwest, for a distance of 3 miles; its greatest breadth, which is at its middle, is about ¾ of a mile. Storm cay, 1¾ miles in length, north and south, lies west of northeast cay, from which it is separated by Orchilla harbor; the eastern side is fringed by a number of small rocks lying close inshore, and near the southern end are some fishing huts. Sand cay and Stone cay are too small cays lying to the southwestward of the southern end of Storm cay. Salt cay, 1 mile long northeast and southwest, is about ½ mile NW. of the western extreme of Mosquito cay. Water cay, ¾ mile long, lies SW. of and close to Salt cay; and to the westward of it is a line of detached rocks ¾ of a mile in length, lying parallel with and close to the shore of the main island.

Rock.—Captain Holt, of the steamer *David Stewart*, reports a rock with 18½ feet of water over it, upon which his vessel struck, lying in the entrance to Orchilla harbor, with beacon on northern end of Northeast cay, bearing SE. by E. ¼ E., distant 450 yards. He also reports a reef as extending 300 yards to the northward, from the north extreme of Storm cay.

The southern coast of Orchilla island is clear and steep-to within 200 yards.

Anchorages.—The harbor of Orchilla lies between Northeast cay on the east, and Storm cay on the west, the entrance being from the north. At the southern extremity of this harbor are a number of small islets and cays, extending entirely across from east to west. Good anchorage can be obtained in this harbor, near the houses of the American salt company, which are situated on the northern end of Northeast cay near the beach. There are two wharves here belonging to the salt company.

On the southwest side of Orchilla island, near the west end, there is a clear white sandy beach, which can be seen in clear weather from a distance of 10 miles, in front of which there is well-sheltered anchorage from the trade-wind, in 6 or 7 fathoms, at about ⅓ of a mile southwest of the houses.

Directions for Orchilla harbor.—When approaching from the eastward bring mount Walker (the highest point on the west end of the island) to bear W. by S. and steer for it until the sand hills on North-

east cay appear ahead; the shore may be approached on this course to within ½ mile, after which haul up to the northward and westward, following the shore boldly round, and doubling the northwest end of Northeast cay within a distance of 100 yards. Then run in for the anchorage on the ballast-ground, near the large buoy lying WSW. about 150 yards from the first point south of the buildings. A vessel having no ballast to discharge should anchor near a buoy lying about 150 yards from the shore between the wharves.

If the wind is scant, after doubling the northwest end of Northeast cay, stand boldly to the southward as far as the dark water near the reefs, and make as many tacks as may be necessary to reach the anchorage. There is plenty of room in the harbor and no dangers in the way other than those marked on the chart.

In making the harbor it is well not to get to leeward of the entrance, as there will be much difficulty in beating up against the wind and an ebb current of 1½ knots an hour, which sets to the northwestward. The depths of water in the harbor are reported to be on an average 6 feet greater than shown on the chart.

Supplies, &c.—Neither water nor provisions can be obtained on this island.

Orchilla island is sometimes visited by American vessels for phosphates.

Arcona breaker.—Breakers were seen from the Prussian corvette *Arcona*, in lat. 12° 55′ N., long. 66° 8′ W., in 1870, the sea at the time being rough. It is probable that one or more rocks exist in this vicinity.

Bank.—The captain of the German steamer *Borussia* observed discolored water, and found, by sounding, 10 fathoms about 6 miles westward of the west end of Orchilla island; judging by the color of the water, it is thought shoaler spots may be found on this bank, which is about 2 miles long and ½ mile wide. Position of the 10-fathom spot: lat. 11° 49′ N., long. 66° 18′ W.

Los Roques is the name given to a large group of cays, situated on a dangerous reef, occupying a space 12 miles in extent, north and south, and 23 miles from east to west. They are all low, with the exception of El Roque, which lies at the northeastern extremity of the group; this islet is chiefly formed of limestone hills, which may be seen when 12 or 15 miles off.

Cayo Grande, the southeasternmost islet, is the largest, and its southeast point bears W. ¾ S. 23 miles from the west extreme of Orchilla island. It is of triangular shape, 7 miles in length, east and west, and 6 miles north and south; the south side is bold and clear, but from the east side a dangerous reef stretches off between 2 and 3 miles, terminating NNW., about 7 miles, from the north end of the cay.

Light.—A light is exhibited from a light-house on the NE. hill of El Roque. The light is *revolving white*, attaining its greatest brilliancy *once every minute;* it is elevated 208 feet above the level of the sea, and, in clear weather, should be seen from a distance of 15 miles.

Cay Sal, which lies close to the west end of Cayo Grande, is very narrow, but 7 miles long from east to west. To the northwest and north of this cay, for a space of 10 miles, there are a great number of smaller islets, without any passage between them, and the surrounding reef is steep-to.

Port el Roque.—At the northeast extreme of the reef, extending 7 miles from the north end of Cayo Grande, is a group of 7 or 8 cays, occupying a space about 4 miles in extent, east and west, and 2½ miles, north and south, in the center of which there is an excellent anchorage, quite secure against all ordinary winds. El Roque, the westernmost and largest cay, is nearly 2 miles long, east and west, and ¾ of a mile broad at its east end. Its western part is formed of limestone hills of moderate height, which are quarried and used for lime and building purposes at Curaçoa.

The other cays appear to be formed of a bed of sand over a coral foundation, which is scantily covered with the samphire plant; some have salt marshes, skirted by mangroves and dwarf trees, large enough however, to form boat's knees and breast hooks, and to be used for firewood.

Water.—There is a well of water at the south end of El Roque, but the supply is uncertain, and it never yields more than 80 gallons a day. Water may also be procured by digging wells in the sand, but it is brackish.

Fish may be caught in abundance, either by the seine or hook; and there is a fishing establishment on El Roque.

Anchorage.—Off the southwest side of El Roque there is good anchorage in 17 or 18 fathoms, about ⅓ of a mile from the beach; but, being to leeward of a swamp on the east end of the island, it is an unhealthy spot, and it will be far better to proceed to the harbor in the center of the cays.

Directions for Port el Roque.—Vessels bound from St. Thomas to La Guayra, generally pass through between Orchila island and Los Roques; but this requires the utmost care, and had better not be attempted in the night. Wrecks frequently occur on Los Roques.

Clear channels lead into port el Roque from the NE., NW., SW., and S.; the three first being about ¼ of a mile, the last ½ mile wide; they are all so clear, and the edges of the reefs which bound them so distinctly seen, that it only requires the eye, with the assistance of the plan, to navigate them. It will, however, be more prudent for a stranger to pass outside all, round the west end of El Roque, and work up to the

South channel. In doing this, Blackman's cay, which indicates the edge of the reef to the southward of the cays, will at first appear like a single large rock, but it is a low islet, covered with bushes, bearing SSE. ¼ E. 4½ miles from the west end of El Roque.

The South channel is formed by Pirate cay and a dry sand-bank about ½ mile to the eastward of it; they are both skirted by a coral ledge, the edge being so shallow that it is easily seen. From the southwest side of Pirate cay the ledge stretches off to the distance of nearly ½ mile, but its limits are equally distinct. The best anchorage will be in the center of the eastern part of the basin, where a vessel will have the advantage of the pure sea breeze.

Current.—The current in the vicinity of this group of cays is extremely variable, both in direction and force, and the changes sometimes take place suddenly. Its velocity has been known to change quickly from ¾ of a knot to even 3 knots an hour.

During the summer—the period of light winds—the velocity of the current between these cays and the gulf of Triste seldom exceeds a knot an hour, and is often less; indeed, the pilots assert that it frequently sets strongly to the eastward for many days together, which enables vessels to work up very rapidly.

Caution.—The wood obtained from Los Roques should be barked before taking it on board, and, indeed, this should always be done in these seas, for green wood with the bark on, being allowed to remain in the hold of a vessel, is undoubtedly a source of sickness.

Islas de Aves are two groups of small, low cays, known as Ave de Barlovento and Ave de Sotavento, lying upon extremely dangerous coral banks. The easternmost bank is about 5 miles in extent, and the southern part bears about WNW. ¾ W. 30 miles from the westernmost of Los Roques; the westernmost bank is 9 miles beyond this in the same direction, and is 6 miles long, north and south, and about 4 miles broad; an approach to either of them is extremely dangerous, especially from the northward, and both should be very carefully avoided.

Buen Ayre island, situated about 30 miles westward of the westernmost of the Aves islands, and 50 miles from the mainland, is a dependency of Curaçao. From Lacre point, the southern extremity of the island, to the northeast extreme, the distance is 12 miles in a northerly direction; and from the latter to the northwest point it is 13 miles; the breadth is from 3 to 4½ miles. The southern portion is very low and sandy, and cut up by cultivated salt ponds; the east side of this part, for some distance, is skirted by a dangerous reef which projects more than ½ mile in some places, but the west side is steep-to.

The northern portion of the island is rugged, uneven, and of moderate elevation, the highest part being at the northwest extreme; the hill over the latter point is known as Brandaris, and so much resembles mount

San Christopher, at the west end of Curaçao, that mariners are apt to mistake the one for the other. The trees on some parts grow in high clumps, and when first seen have the appearance of towers. From the northeast extreme, all round the west end, the shore is clear and very steep-to, and the water is so clear in this part of the sea that the bottom is seen at a great depth.

In the bend of the bight on the west side of the island, about a mile from the shore, is a small islet named Little Buen Ayre, and abreast it lie the town and fort.

Lights.—Lacre point, the southern extremity of Buen Ayre, is a low rocky spit of land, terminating in a reef of sand and coral. Near the extremity of the point is a white tower, 75 feet high, with vertical stripes of red, from which a temporary light is exhibited, at an elevation of 85 feet above the sea level, which should be visible in clear weather from a distance of 12 miles.

El Puerto.—A light is exhibited from a light-house erected on Orange battery, west side of Buen Ayre island, and fronting Buen Ayre islet. The light is *fixed white;* it is elevated 29 feet above the sea, and should be seen in clear weather from a distance of 3 miles. The light-house is a small two-storied tower, square in shape, and painted yellow. This light in line with a light shown from a standard, 10 feet high, at the extremity of the landing stage, indicates the anchorage.

Anchorage.—The shores of Buen Ayre are so bold that the only anchorage lies off the town, in 17 fathoms, at 300 yards from the shore; and the bank is so narrow and precipitous that it requires care and skill not to shoot in too far, and not to bring up too short, to risk dragging the anchor. The best way is to have a kedge and large hawser in a boat, ready to make fast to one of the old guns or anchors, placed near the battery for this purpose, and not to drop the anchor until having hauled into a berth. A vessel may pass in or out of the bight on either side of Little Buen Ayre, but the southwest channel will be found the most convenient.

Little Curaçao is a very low islet of coral, stones, and sand, partially covered with prickly pear and mangrove bushes, the tops of which are only about 10 feet above the sea. It is about 1½ miles long, north and south, and ¼ of a mile broad, and so steep-to that within 100 yards of it there is no bottom at 40 fathoms, except to the southward, where it is said soundings have been obtained at ½ mile off.

Light.—A *fixed* and *flashing* light, showing one flash of *six seconds'* duration in *every minute* preceded and followed by an interval of *seven seconds'* darkness, is shown from a light-house on Little Curaçao island. The light is elevated 75 feet above high water, and should be visible in clear weather from a distance of 14 miles. The light-house is a round

tower, painted white, and stands in the middle of the island between and adjoining two dwellings, each of which is two stories high, and has a red roof.

Curaçao island, having the advantage of possessing one of the finest and most commodious harbors in the West Indies, carries on an extensive commerce, in exchanging the merchandise of Europe and other countries for the products of Venezuela and New Granada.

The island, a Dutch possession, is 33 miles long from ESE. to WNW., and about 6 miles across in its greatest breadth, and is of considerable elevation. The Table mount, or Tafelberg, about 5 miles westward of Cañon point, comes first in sight, when making the island from southeast, and has the appearance of a separate island; Rounde Klige, on the northeast shore, and San Hieronymus and San Christoffel mountains, on the western part, are also remarkable objects. The latter, which is situated about 4 miles from the northwest extreme of the land, is about 1,200 feet high. The surface of Curaçao island is generally rocky and barren, yet in some parts it produces in perfection the finest fruits of of the West Indies.

The north coast of the island is everywhere bluff, clear, and steep-to; and its rocky shores almost overhang the sea, which breaks on it with great violence. The south side is bordered by a bank of sand and coral which extends off about 200 yards. On this shore is situated the fine harbor of Santa Ana, where the whole commerce of the island is carried on. There are also several small harbors and coves, one of the best of which is Spanish or Santa Barbara cove, which is recognized by a fort and flag-staff about 7 miles to leeward of Cañon point.

The divi-divi bean, used for tanning purposes, is largely cultivated and exported; the other articles of export are salt and phosphate of lime. There is no wood on the island, except that yielded by private plantations; large quantities are imported from Buen Ayre.

There is steam communication with the United States and Europe, and the mails are sent once a month to and from St. Thomas and St. Domingo by schooners. There is no telegraphic communication.

Water.—Although destitute of running streams, there is plenty of good well water; and rain-water, collected in tanks, is also to be obtained, but the charge for it is generally very high.

Santa Ana harbor, the entrance to which is situated about 12 miles from the east extreme of Curaçao, is a basin or lagoon about 2½ miles in length, from east to west, but having several small islets and projecting points that vary its breadth considerably; in the center, however, there is a clear space, with a depth of 8 to 11 fathoms, where a number of large vessels may lie in perfect security.

The entrance to the harbor is very narrow, and is formed between two low tongues of land, only 100 yards apart, strongly defended on the east side by fort Amsterdam, and on the west side by fort Rif; be-

sides which, a chain is in readiness to be run across in case of necessity. Just within the forts, on the east side, stands the town of Willemstad, and on the opposite shore is Overzijde. The inner part of the channel is from 100 to 200 yards in width, and runs nearly in a straight line NNE., ¾ of a mile, when it opens out into the lagoon, which is known as the Schottegat.

Vessels of war generally lie in the Schottegat, for, having the advantage of a continual pure breeze day and night, it is more healthful, and there is less annoyance from the mosquitoes, which at times are insufferable. Merchant vessels find it more convenient to lie alongside the wharves that line the channel, and where those of every size will find means for heaving down or refitting.

The entrance of this harbor is much narrowed by the effects of a hurricane experienced in September, 1877. This storm destroyed many houses, and caused the wreck of several vessels. The last hurricane recorded previous to the one of 1877 occurred in 1807.

There is a garrison of 200 men at Santa Ana.

There are about 60 vessels belonging to the port of Santa Ana, several of which are schooners of 40 to 110 tons register.

Light.—A *fixed* white light is shown from fort Rif, on the western side of the entrance to Santa Ana harbor.

Buoy.—A large *white* mooring-buoy lies at the entrance, close off the SW. angle of Fort Amsterdam, on the eastern side of the channel.

Supplies.—Provisions can be obtained in any quantity; they are all brought from the United States. Fresh meats are of poor quality.

Rain-water can be obtained of good quality; it is brought off to ships in casks, at a cost of one cent per gallon.

Coal.—American and English coal can be obtained, at a cost of from $10 to $12 per ton. Vessels can coal either alongside the wharf or from lighters in the stream.

Directions for Santa Ana harbor.—Vessels bound to the harbor of Santa Ana from St. Thomas, or from the northward, generally endeavor to sight the high land at the northwest extreme of Buen Ayre island, in order to be well to windward; but, as already pointed out, the Brandaris hill so much resembles mount San Christoffel, at the west end of Curaçao, that they are often mistaken for each other. Care should be taken not to do so, for, if the latter be made first, and, being taken for Brandaris, a course be shaped to the SW., a vessel may find herself far to leeward before discovering the error, and meet with considerable delay in getting to windward again.

When bound from the northward, care should be taken when rounding the east extreme of Curaçao, as it is very low, and the current sets towards it from the eastward with great strength. Vessels approaching from the eastward will first sight either the light on Little Curaçao

or the Table mount. The south side of the island should be navigated at the distance of 1 or 2 miles. A pilot will be found waiting in his boat about a mile to windward of the entrance, but he is not permitted to take any vessel into harbor after sunset.

With the wind strong from the NE., it will rush off through the channel in baffling gusts; therefore one or two hawsers should be at hand, or one coiled in a boat astern, ready to run out to the posts placed on either side of the channel for this purpose. The best mark in running down is to keep the westernmost angle of the Rif fort directly under the sharp point of Priest mount. When near the entrance, the yards must be braced sharp up, and everything ready to clew up and anchor the instant the sails become aback, to prevent getting on the lee shore, which is foul off some places. The moment a crane or crab, situated on an elevated spot, is seen, from the forecastle, to open out westward of fort Amsterdam, luff boldly up, and when the vessel's way is lost, bring up, or run out the warps. A ledge extends 200 yards to the southwest from the water battery under fort Amsterdam; but the discolored water on the edge is easily seen, and is marked by a white buoy.

With the wind from the SE. there is no difficulty, as a vessel will sail through the channel into the harbor, and the middle of the entrance may be taken from a wide offing, as soon as the channel is fairly open; it is to be observed, however, that a strong westerly current generally comes close home to the shore.

A vessel bound hither from the westward, would do well to try the direction of the current off the mainland first, as it is sometimes found running to the eastward; but should it be otherwise, she will do better by standing out at once, and working up to the northward of the islands, reaching off to at least 40 miles.

It is customary for vessels after passing Cañon point, and unable to reach the port in daylight, to lie-to with little Curaçao light bearing east, or to stand off and on until morning; but it is not recommended to do so near the east end of Curaçao, as an eddy current is formed along shore, setting ENE. back to Cañon point, from a place known as Hala Canoa, 1½ miles to the westward, which is low and rocky, with a lagoon inside, and therefore difficult to be seen at night. Several vessels have been wrecked in this position. It is better to run farther to the westward until abreast of Santa Barbara or Tafelberg, and then heave-to, head to the southward, when this danger will be avoided.

Current.—The current runs WNW. near the shores of the island, sometimes at the rate of 3 miles an hour.

Westpunt bay.—This anchorage is situated at the northwest extreme of the island. A bank of 5 fathoms extends nearly from the north to the south point of the bay, inside of which a general depth of 10 or 12 fathoms will be found, affording good and secure anchorage. Sea-

ward of this 5-fathom bank the average depth is 12 to 15 fathoms, extending about ½ mile off shore, where the soundings terminate abruptly.

Good temporary anchorage may be obtained in St. Kruis bay, Port Marie bay, Dai booi, St. Michael bay, and Piscaderos bay. All of these bays are on the southwest side of the island.

Caracas bay, lying 5 miles eastward of Santa Ana harbor, affords good anchorage. It is the quarantine ground for the island. On the east side of the bay is the lazaretto, off which a buoy is moored in 12 fathoms, for the convenience of shipping.

Oruba island, the east extreme of which bears W. ¼ N., 43 miles from the northwest point of Curaçao, and NE. ¾ N. 16 miles from cape San Roman, is 17 miles long SE. and NW., and about 4 miles broad; the extremities are level and very low, but in the middle it is of moderate height; the Pan de Azucar is visible 18 or 20 miles off, and when first sighted the land towards the west end appears in broken hummocks.

The south side of the island is skirted by a chain of low, bushy cays, which extend from near the southwest point to within 3 miles of the east end, where they terminate in a rocky islet considerably higher than the others; they are bold and steep-to. About 3 miles westward of the Pan de Azucar hill there is a projecting sandy point, and between it and the cays to the westward is an opening leading into an anchorage, named Orangestadt harbor, where there is a small settlement.

Lights.—From point del Cerrito-Colorado, east point of Oruba island, a temporary *fixed white* light is exhibited, visible from a distance of 9 miles, between the bearings NW. and SW., over an arc of 90°.

At Orangestadt a *fixed white* light is exhibited, visible 6 miles from all points seaward.

Water.—There are no springs on Oruba island; good and wholesome rain water is collected in tanks, but it is scarce. Water may also be procured by digging wells a few feet into the sand at a short distance from the beach at Orangestadt.

Directions for Orangestadt harbor.—Vessels having occasion to visit this harbor for provisions, or to repair damages, should get close in with the cays as far to windward as the Pan de Azucar, before running down, on account of the strong westerly current which generally prevails.

From the opening to the harbor of Orangestadt, the Pan de Azucar bears E. by N., but in coming from the eastward, the town will open before the Pan de Azucar comes on that bearing. A vessel should give the east entrance point a good berth, to avoid a rocky ledge which makes off from it, and round into the anchorage, and come to, in from 3½ to 5 fathoms water, with the light-house bearing about N. by E. To

the eastward of this line, the water shoals suddenly from 3½ to 2 fathoms, but again increases in depth before the ledge lying north of the opening is reached.

Vessels of moderate draught may go within the reefs, and anchor close off the town in from 2 to 5 fathoms, sandy bottom, but the channel is hardly 200 yards wide.

Strangers had better take a pilot, for, if the port is missed, it will take some time to beat up again.

Anchorage.—The best anchorage off Oruba island is about 4 or 5 miles northwestward of the village. Here a vessel will find good shelter, on a white bank, in about 7 fathoms, at ¾ of a mile from the shore, with the Pan de Azucar at the back of the village, bearing E. ¾ S., a low, white, sandy point, N. ¼ E., and the easternmost extremity of the land SE. ¼ E. Care, however, must be taken to pick out a clear spot, as some parts are rocky. There is also anchorage under the west end of the island in 6½ fathoms, coral and sand, about 1 mile from the shore.

CHAPTER VI.

COAST OF NEW GRANADA.—CAPE CHICHIBACAO TO PORTO BELLO.

This chapter describes the northern shores of the republic of New Granada, including the coast line of the provinces of Rio de la Hacha, Santa Marta, Savanilla, Cartagena, Antioco, Choco, and Panama, a distance of 700 miles.

Winds.—From cape La Vela to point San Blas, the trades blow from NE., into the gulf of Darien with great strength, from November to March or later. These strong winds extend from the middle of the Caribbean sea to within 5 or 10 miles of the coast, where they greatly abate, especially at night.

In July, August, and September, vessels proceeding to windward. will frequently be assisted by a westerly wind, for two or three days together, when near the coast.

Along the same coast, as far as the gulf of Columbus or Nicaragua, these westerly winds occur from July to November, and are termed *Vendavales*, or head winds. These winds, however, extend only to the parallel of 13° N., and interrupt the regular trade-wind.

In the space between Maracaibo and the greater islands to the northward, should the trade-wind at daylight be from ENE., at noon it will generally be about E. by S., if the day is clear. The knowledge of this gives a great advantage when working to windward, enabling a vessel to stem the current for some hours.

Current.—From cape La Vela the greatbody of the current runs about west, diminishing in velocity as it expands over a greater space. On nearing the mouths of the river Magdalena, the stream is sometimes diverted to the NE.

Westward of this river, a part of the main stream is deflected to the SW., into the gulfs of Darien and Columbus.

Gallinas point.—From cape Chichibacao, the coast trends NW. ¼ W., for 4 miles, to cape Falso, and then in a general direction WNW. ¼ W., about 22 miles, to Gallinas point, which is the most northerly projection of the peninsula of Maracaibo, and is very low, with a sandy beach.

Dirks shoal.—A shoal, of 3½ fathoms water, called Dirks shoal, is reported to exist, north, 2½ miles, from Taroa point (6 miles eastward of Gallinas point), and it is probable that shoal water exists between that and Taroa point.

Druid shoal, 5 miles NNW. from Gallinas point, is a bank upon which the depth shoals suddenly from 10 to 4½ fathoms, and it is said there is as little as 2 fathoms in some places. Vessels, therefore, in running down this part of the coast should not approach nearer than to bring the low sand hills on the shore just in sight, the mountains of Chiniare, in the interior, being visible at the same time, in clear weather.

Bahia Honda.—From Gallinas point the coast trends WSW., 5 miles, to Aguja point, which has foul ground extending to the distance of a mile off it. Thence the shore curves to the southward and southwestward, for about 4 miles, to the eastern entrance point of Bahia Honda. In this space, known as Bahia Honda Chica, the water is very shallow, and affords no shelter or safe anchorage; the shore is low and barren, but may be safely navigated with proper attention to the lead.

The entrance to Bahia Honda is about 3 miles wide, and the interior is 7 miles in length, northeast and southwest, and about 3 miles in breadth. On the east side there are some remarkable red cliffs; the west entrance point is low. Anchorage may be taken up as most convenient on the east side of the bay, in 8 to 5 fathoms.

Boca bank, the only danger in Bahia Honda, is a shoal about 800 yards long, east and west, which lies in the entrance, on a line between the two entrance points. Its western extremity is about ¾ of a mile from the west entrance point of the bay, and the east extreme is about 1¾ miles from the east entrance point. The eastern extremity has only a depth of 1 foot water, and sea the breaks over it in light breezes; it is therefore easily seen and avoided.

St. Germain shoal, situated W. by N., 5 miles, from the west entrance point of Bahia Honda, has 19 feet water on it, and 22 to 37 fathoms close around.

El Portete.—The coast at Bahia Honda begins to rise and trends to the southwest about 11 miles to the narrow entrance of a large shallow bay or lagoon, named El Portete, which is only fit for small vessels.

Cape La Vela.—Westward of El Portete, the shore takes a W. ¼ S. direction, for about 11 miles, and is clear as far as a little hill, which projects about ½ mile, and rises abruptly from the shore in the shape of a sugar loaf, against which the sea breaks with great violence. From this hill a rugged ridge of land trends to the southwest, about 3 miles, to a bold headland named cape La Vela; some authorities, however, give this name to the hill just described. About ¼ of a mile westward of the cape there is a round islet or rock, steep-to within a short distance. In the channel between it and the shore, the depth decreases from 5½ to 4 and 3 fathoms near the cape, so that a vessel, in a case of necessity, may run through in safety by keeping close to the rock.

The land immediately within the cape is very low and sterile, but at about 7 miles inland, southeast of it, the Sierra del Carpintero rises to

a great height; and at about 17 miles southward, a short distance inland, there is a remarkable conical hill, a great part of which has a chalky appearance.

When seen from the westward, from beyond the distance of 7 or 8 miles, cape La Vela makes like a number of small islands.

Anchorage.—Off the south side of cape La Vela there are 5½ fathoms, at 2 miles from the shore, whence the depth gradually diminishes inwards, over a clear sandy bottom. Good shelter, with the usual breezes, will be found with the small islet off the cape, bearing about N. by E., about 2½ miles distant, in 7 fathoms.

A few Indians reside on the shore, from whom fresh meats may be procured, but it is said they are not very friendly. Water is scarce.

Coast.—The coast from cape La Vela sweeps round to the south and southwest to Castilletes point, which bears S. by W. ¾ W., distant 23 miles. It is all along very low, and the point is only recognized by a large grove or clump of mangroves near it. At 9 miles E. ½ N. from Castilletes point is the little hill of Remedios.

Manare point bears WSW. ½ W., distant 14 miles, from Castilletes point. Between them the shore curves a little to the southward, and the beach is intersected by two slightly projecting points.

Westward of Manare point, the shore trends in nearly the same direction, for 13 miles, to point de la Cruz, and in this space there are also several small projections, known as Almidones, Pajaro, and Jorote points.

Pajaro shoal, between the two last-mentioned points, and 4 miles eastward of point de la Cruz, is a very dangerous sand-bank, with only 2 fathoms on it, about 1½ miles from the shore. The outer edge is said to lie 3 miles from the land, and sometimes shows itself by breaking; vessels are advised not to approach this neighborhood within the depth of 10 fathoms.

La Hacha.—At 4 miles SW. from point de la Cruz is situated point de la Vela, and SW. ¾ S., 7 miles, from it, is the entrance to the Rio de la Hacha. The whole of this part of the coast is very low, and presents nothing remarkable until near the latter place. The town of La Hacha is situated on the shore on the west side of the above small stream, and on the opposite bank there is some dark-wooded land, higher than that adjacent, which hides the town from the northeast. It will be recognized from the offing, when nearly abreast it, by the large square tower in the center of the church. La Hacha is the capital of the province; it carries on some commerce in dye-woods, and is rising in importance.

Anchorage.—The best anchorage off La Hacha will be found with the church bearing SSE., in 5 fathoms, or nearer in, according to the

draught of the vessel, bearing in mind that the 3-fathom line is 2 miles from the shore. Being, however, so completely exposed, it is by no means a desirable roadstead, especially in the season of the breezes (December to April or May).

Light.—A *fixed white* light is exhibited from the tower of the church at La Hacha, and is visible in clear weather from a distance of about 10 miles.

Directions for approaching and leaving La Hacha.—Vessels leaving La Hacha, bound westerly, should stand well to the northward before bearing away. In working up, they should stand in to 10 fathoms, and off to 60, until to windward of Pajaro shoal, when the shore may be more freely approached, and anchorage taken up, if necessary, in 6 or 7 fathoms.

Should a vessel run west of La Hacha, her error will be discovered by the soundings, or by a bearing of the remarkable snow-topped mountains rising between La Hacha and Santa Marta, and which are visible 60 or 70 miles. The highest, known as the Sierras Nevadas, form two sugar-loaf shaped peaks, which are 16,419 feet above the level of the sea, and bear about SW. ¼ S. from La Hacha.

Navio Quebrado shoal.—From Rio de la Hacha, the coast trends SW. by W., 16 miles, to Caricari point, which separates the entrances of two large lagoons. At about 2¼ miles NW. from this point there is a very dangerous shoal, named the Navio Quebrado, and vessels passing this spot should not come into less than 20 fathoms. The western edge of the elbow of the 5-fathom line trends north, 9 miles, from this shoal; and in that direction, by proper attention to the lead, the soundings will give a sufficient warning of approach.

Coast.—The coast from Caricari point to Dibulle point, which is 14 miles distant, trends nearly SW., when it takes a westerly direction, for 39 miles, to cape San Juan de Guia.

The 5-fathom line passes close to Dibulle point, and to the westward of this the coast is clear and steep.

Near Dibulle point there is a small commercial town, off which there is anchorage; and the riding and landing are much easier here than off La Hacha. From cape San Juan de Guia, the shore takes a west direction, for about 4 miles, when it curves to W. by S., for 8½ miles, to cape de la Aguja. This space is very irregular in outline, forming several small inlets and coves, free from danger, and affording good shelter; they are known as Guachaquita, Cinto, Nahuange, Chengue, and Concha coves. These coves are separated by high, cliffy, rugged hills, which form bold projecting headlands steep-to, and when first seen from the westward appear as several islands.

Cape de la Aguja.—Cape de la Aguja is the northern extremity of a small islet separated from the mainland by a channel 600 yards

wide; but as reefs extend from both sides, it is too narrow to be safely navigated, although it has sufficient depth for any vessel. NW. of the islet there are three rocks above water, near to each other, the outermost, which is also the largest, lying 600 yards off. At a short distance westward of the west extreme of the island, there is also another rock, which is higher than either of the former; they are all clear and steep-to.

Comus shoal.—This shoal was reported by H. M. S. *Comus*, in 1840, as having from 10 to 3 fathoms on it, and being 3 miles off the land, with cape Aguja bearing NE., distant 3½ miles. The existence of this shoal is, however, considered doubtful.

Taganga bay.—From cape de la Aguja, Betin point, the north entrance point of Santa Marta bay, bears S. by W., 5 miles; to the northward of the latter the shore sweeps round to the eastward and northward, for about 1½ miles, forming the bay or bight of Taganga. The land around is high and cliffy, with some beaches and coves steep-to; there are also in this neighborhood some remarkable white cliffs, which may be seen from a distance of 10 or 12 miles; there are no others of the same appearance on this part of the coast, and consequently they help to guide to Santa Marta.

Santa Marta bay, formed between Betin and Cuerno or Gairo points, is 1½ miles wide, and being sheltered from the usual breezes, is one of the best and most convenient anchorages on this coast. The city of Santa Marta is the capital of the province of Santa Marta; it stands on the shore on an extensive plain at the base of a lofty ridge of mountains, which, rising gradually in rugged conical peaks, terminate in the snowy summits of the Sierras Nevadas; these peaks bear SE. by E. ¼ E. from the bay, and are a good guide for it.

The city was formerly of considerable commercial importance, its exports consisting mostly of cocoa, rice, and cotton, and a short distance from it are some natural salt pits or mines; the trade with the interior is carried on principally by means of large canoes, and steamers of light draught, which communicate with the river Magdalena. The river Manzanares enters the sea at a short distance southward of the city, and supplies it with water by means of an aqueduct, which runs along the sea front.

Since the railway connecting Barranquilla with Savanilla has been opened, much of the trade of the interior has been diverted to the latter port; this, together with the increased facilities for navigating Magdalena river, has caused Santa Marta to gradually fall into decay.

Few vessels now frequent the port, and the wharves are in decay.

About 200 yards to the westward of Betin point, lies a small conical rocky islet, named the Morro chico, 82 feet high, and in the channel between, near the middle, there are 4½ fathoms water, but it is not safe to navigate, on account of the unsteadiness of the breeze; the west side of

the islet is steep-to. About 600 yards westward of the Morro chico, is a much larger islet, with almost perpendicular sides, called the Morro grande, 200 feet high; there is a ruined fort on the summit. From the northwest and southeast points of this islet, a ledge extends about 100 yards; but elsewhere it is steep-to, and the only landing place is near the middle of the south side.

Light.—A *fixed white* light is shown from the fort on the top of the Morro grande, at 328 feet elevation; it is visible, in very clear weather, 24 miles. This light cannot be relied on.

Abreast the city, and as far to the southward as the mouth of the Manzanares, a shallow bank stretches off ¼ of a mile, and its edge, in 3 fathoms, lies with the hill of San Antonio, at the north end of the bay, in line with the hill on Taganga point; inside this line the depth gradually decreases to the shore; this shoal is gradually increasing, from the deposit brought down by the river.

From the southwest side of Betin point, a coral ledge, named Druid rock, with 7 or 8 feet water on its outer extremity, lies W., ½ S., 30 yards, from the south extreme of the point; close outside, there are 4½ fathoms, but there is no passage within it.

Provisions are to be had in limited quantities, and are very high.

Water, of indifferent quality, may be obtained with great ease, at the entrance of the river Manzanares; it should be taken, however, very early in the morning, before the washerwomen commence to work. The use of this water should be avoided if possible.

Directions for Santa Marta.—When approaching Santa Marta from the northward or westward, should the peaks of the Sierras Nevadas be invisible, there will be seen, when at a considerable distance, a remarkable division or separation in the mountains which overlook the city. When close to the shore, this gap will be lost sight of, and the bay will then be found by steering for the highest mountain at the south end of the Santa Marta range.

If the wind be to the northward of E., the channel between the Morro islets may be taken without fear, being careful, however, not to haul into the cove at the north end of the bay before Betin point bears to the northward of ENE., to avoid Druid rock. Should the wind be at E., or to the southward of it, and blowing strong, it becomes so variable under the high land, and rushes off so violently, that it will be better to pass outside Morro grande, and work into the bay between it and the main, where it is quite clear. Soundings will not be obtained until on a line between the islet and Cuerno point, where there are 30 fathoms, and from thence the depth gradually decreases inwards.

Between the months of March and December, a SW. wind is generally experienced between 10 a. m. and 1 p. m., extending 2 or 3 miles off shore; after 1 p. m., the trade wind occasionally blows home, but more frequently blows from the northward.

At this season of the year, a sailing vessel, arriving off the port in the morning, should run down westward of Morro grande, and then endeavor to close the land sufficiently to pick up the SW. wind, and with it proceed to the anchorage, passing inside of Morro grande.

Anchorage.—Anchorage can be taken up anywhere, but the farther to the northward, the smoother will be the sea; for the convenience of watering, however, a berth may be chosen about 400 yards from the mouth of the Manzanares, but it will be necessary to drop another anchor to the SW., and to lie with a long scope of cable, to prevent dragging off the bank in the heavy gusts. Merchant vessels, and those requiring repairs or careening, lie in the cove at the north end of the bay, and moor with a cable to the shore. The anchorage off the city is the best, from March to December; at other seasons, heavy squalls are experienced at this position.

Tides.—There is no regular tide in Santa Marta bay, but in the month of March the water has been known to rise 4 feet.

Tribune shoal.—Broken water was reported by Captain Willoughby, in 1823, to have been seen in lat. 12° 12′ N., long. 74° 32′ W., and reported again by the *Tribune* in 1827, in lat. 12° 11′ N., long. 74° 26′ W.

H. M. S. *Blanche* searched for this shoal on two occasions, in the year 1878, but without success. This vessel steamed along the position assigned to the shoal for several miles east and west, and, on one occasion, as far as 75° west longitude, but without seeing anything to indicate the existence of shoal ground.

It has been stated also by another authority, that, during a period of four years, the vessels of the West India and Pacific Steamship Company crossed the locality of Tribune shoal, but without seeing anything to indicate the existence of a shoal.

Coast.—The coast from Cuerno point, the southern extremity of Santa Marta bay, trends S., about 14 miles, to the Boca de la Ciénaga, and then sweeps round in a westerly direction, for 26 miles, to the Boca de Rio Viejo, the eastern mouth of the Magdalena. The Boca Ciénaga leads into an extensive shallow lagoon, which communicates with the Magdalena by several small creeks, navigable for canoes.

Ciénaga.—At 12 miles south of Santa Marta is the village of Ciénaga, lying about ½ mile from the beach, on low ground; the houses are built principally of mud, and the roofs only are visible from the anchorage. The church tower is a conspicuous object, and seen at a distance of 10 miles. The best anchorage is with the church tower bearing S. by E. ½ E., 2½ miles, in about 4 fathoms. South of this is the Pueblo de San Juan, having also a conspicuous church tower.

Rio Magdalena.—The length of this great river is said to be 840 miles, and it reaches the sea by two arms, called the Boca de Rio Viejo

and Boca de Ceniza—the latter about 6 miles to the westward of the former—which, uniting about 6 miles from the sea, inclose the island of Gomez, which is flat and densely wooded. At the junction of the arms, on the western shore, is the town of Barranquilla, the capital of the province of Savanilla; it stands about 80 feet above the level of the sea, and contains 18,000 or 20,000 inhabitants. The Magdalena is navigable as far up as Honda, about 380 miles in a direct line from the sea, and three days' journey from Bogotá, and in its course receives the waters of many tributaries, some of which are navigable.

Steam vessels, drawing about 3 feet water, make regular passages between Barranquilla and Caracoli, situated near Honda, of which it is the port; this may be considered the limit of navigation, as only canoes can be used above this point.

Off the mouths, and to the distance of 15 or 20 miles, in the rainy season, the river water gives the sea a greenish tinge, and the influence of the stream running to the north and northeastward, with discolored water and drift-wood, may possibly be felt as far as lat. 12° 25′ N. When the river stream comes in contact with the Caribbean current, running to the westward, it frequently causes a violent race, and, if encountered in the night, is alarming to strangers. The spot where this takes place will, of course, depend upon the strength of the two streams, but it has been met with 60 miles from the mouth of the river.

Boca de Ceniza.—This, the western and principal entrance from seaward to the river Magdalena, is situated between Gomez island and some low cays to the westward.

Cape Augusta, lying 2½ miles west of the western entrance point, is a wooded hill, and the most northern point of this part of the coast, appearing as an island, when seen from seaward. Alligator point, 29 feet high, and nearly 1 mile within the eastern entrance point, is conspicuous from seaward, being formed of white sand, with high trees in the background; good anchorage, in 5 fathoms water, will be found at 400 yards northwest of Alligator point.

Bar.—The bar of Magdalena river, formerly considered unnavigable, except for vessels of very light draught, was crossed by H. M. S. *Bullfinch* (drawing 10½ feet) on 21st of August, 1875, the least water obtained being 28 feet. The *Bullfinch* was in charge of a local pilot, and proceeded up the river nearly as far as Barranquilla.

The mouth of the river was apparently 1½ miles wide, of which width, it was considered, only about ¾ of a mile would be navigable for boats, and a width of about 300 yards available for vessels.

At the time the *Bullfinch* entered, the tide was flooding, and the wind fresh from the NE. There was a heavy surf on the beach on either side of the entrance, but the bar itself was comparatively smooth, and appeared to be of small extent longitudinally.

The passage was easily discerned, and the vessel being kept on a S.

by E. ½ E. course, at a distance of 100 yards from the eastern breakers soundings of 5 fathoms (with one cast of 28 feet) were obtained. A good mark to show when the bar is fairly open, is the white cliff in the bend of the river, on the western bank, open of the south point on the eastern boundary of the bar.

Having followed the eastern breakers to their termination, the *Bullfinch* crossed gradually over to within 60 yards of the western bank of the river, which bank appeared to be steep-to. Preserving that distance from the west bank, soundings of 5 to 7 fathoms were obtained, up to the mouth of the creek leading to the town of Barranquilla, which is about 2 miles from the mouth of the creek, and 6 or 7 miles from the bar. The creek has a depth of 5 to 10 feet, and is used by the river steam vessels.

In the latter end of the month of July, 1878, the Ceniza mouth of the Magdalena river, as far as the entrance of the creek leading to Barranquilla, was surveyed by Captain N. Mayet, of the French vessel of war *La Bourdonnais*, when the least water found in the channel of the bar was 23 feet. The extent of the bar is about 600 yards between the breakers, which prevail on either side of the entrance in fine weather, and about 200 yards in width; that is, passing from north to south.

Directions for entering the Boca de Ceniza.—Steer with Alligator point bearing S. by E. ¾ E., until soundings of 26 feet are struck, then steer S. ¾ E., altering course a little to the eastward, if the depths diminish to less than 23 feet; a vessel will thus pass 200 yards distant from the small sandy beach situated to the northward of Alligator point. Soundings of 29 feet will denote that the bar is crossed; when Alligator point bears E., steer gradually over towards the western shore to within 200 yards. Preserving that distance, soundings of 6 to 7 fathoms will be found up to the creek leading to the town of Barranquilla. The mouth of this creek is 4½ miles from the bar.

Captain Mayet remarks that the bar is easy to cross, at almost any time, for vessels drawing 15 to 18 feet water. The bar is not stationary, but has tended for many years to move to the eastward.

The Netherlands sloop of war *Cornelis Dirks*, drawing 14½ feet, entering the river (11 September, 1878) subsequent to the survey by Captain Mayet, had 23 feet least water; a light wind was blowing from NNE., and the bar was smooth. On the 24th September, the British steamship *Alps*, when leaving, had not more than 18 feet on the bar; the weather was then calm, and the vessel crossed without pitching or rolling. Captain Williams considers that, had there been a swell on, the *Alps*, although drawing only 15 feet, would, probably, have touched.

Masters of other steamships trading to Baranquilla do not consider the bar safe. In July, 1880, there was a depth of about 17 feet water on the bar of Rio Magdalena, but the depth was very variable, and it is ordinarily considered unsafe for vessels drawing more than 14 feet to cross. During the months of April, May, and June, 1880, three vessels

were lost on the bar at the entrance to Magdalena river, and when the *Tourmaline* passed it, on the 1st July, there was a vessel stranded, and had partly sunk into its shifting sands. The steamships of the Atlas Company are the only vessels which now cross the bar, and they do so at great risk, on account of its frequent shiftings.

From the foregoing remarks, it would appear that the bar of Magdalena river is subject to marked changes in depth at short intervals of time; mariners should consequently exercise due caution in entering and leaving the river.

Tides.—The range of tide is about 2 feet; the current in the river runs at the rate of 2 knots an hour, and, during freshets, 4 knots an hour.

Coast.—The coast of the delta of the river between Rio Magdalena and Savanilla bay, is formed by a succession of flat wooded islands, which, at 8 miles westward of cape Augusta, terminate at Verde island.

Verde island is low and swampy, being covered with clumps of mangrove trees. From the north shore of this island a shoal sand bank, on which the sea breaks heavily, extends for a considerable distance, but the western point is tolerably steep-to, with a depth of 5 fathoms water at 200 yards from the shore.

Savanilla harbor.—The north side of Savanilla harbor is formed by Verde and Savanilla islands, connected by a sand bank nearly awash; from the south sides of these islands an extensive bank, known as Culebra bank, extends to the southward, occupying the whole eastern part of the harbor. Hermoso point, the south entrance point of this harbor, is a cliffy point rising in terraces, and bears SSW., distant 5 miles, from the west extreme of Verde island.

The south shore of the harbor is skirted to a short distance by a bank, and at about 3 miles eastward of Hermoso point is a small range of remarkable reddish yellow cliffs, about 120 feet high, the eastern part of which forms a table-topped hill, with a square hummock resembling a battery.

On San Antonio point, a rising bluff under the high land, about 3 miles northeast of these cliffs, there is an old fort, which, however, is not easily recognized; and also the barrack hospital, a large white building, showing on its northern face a double row of arches, and standing at an elevation of 50 or 60 feet above the sea. On the northwestern extremity of the mainland is the town of Savanilla, consisting only of a few native houses, and at 1½ miles southwest of this is the town of Salgar, where there are a few native houses, a wooden mole, and stone quays. Trains from Baranquilla unload their merchandise at this mole, from which it is conveyed in steam barges to the outward harbor of Savanilla, for transshipment. The harbor above Salgar is reported to be rapidly filling with sand.

There is a considerable trade carried on at Savanilla. The exports are rubber, hides, coffee, sugar, balsam, hard woods, dye woods, &c. British, French, and German mail steam vessels call regularly at this port.

Coal.—Cardiff coal can be had in very small quantities—generally less than 100 tons on hand—and it has to be transported some distance in lighters.

Light.—From a light-house near Cupino beach, which extends northeast from the red cliffs, a *fixed and flashing white* light is exhibited at an elevation of 98 feet. The characteristics of this light are as follows: *fixed* 35 seconds, *eclipsed* 9 seconds, *flash* 3 seconds, and *eclipsed* 9 seconds. The flash is visible 15 miles, the fixed light not so far. The light is obscured when bearing south of SE. by S. This light is not to be relied upon.

Signal station.—On Nispéral point there is a signal station, with which vessels using the commercial code of signals can communicate; there is also a telegraph station on the same point, in communication with the town of Baranquilla.

Robinson rock, with 18 feet water on it, and 7 to 8 fathoms around, lies W. by N., distant about $\frac{3}{4}$ of a mile, from Hermoso point.

Culebra bank.—A red buoy is moored in 12 feet water, close to the southern edge of Culebra bank. Vessels should not attempt to pass north of this buoy.

Rock.—A rock on which the French mail steamer *La Fayette* struck, in 1878, has since been found to be about 100 yards in extent, with 20 feet least water, and 24 feet, muddy bottom, close around. From the rock, the light-house bears E. $\frac{1}{4}$ N., $1\frac{3}{10}$ miles. A black buoy is moored in 25 feet water on the east side of this rock.

Cupino bank.—This bank, about 400 yards in length, having several shoal heads just awash, lies about 400 yards off shore north of the eastern red cliff on the south side of the harbor; this bank lies just within the line of San Antonio and Nispéral points in line.

Arena bank, forming a prolongation of the south point of Savanilla island, separates the inner and outer harbors; portions of this bank are always above water, and its southeast point is marked by a beacon. The entrance to the inner harbor is south of this beacon, but there is only 7 feet water in the channel, and only 8 to 9 feet in the inner harbor.

Anchorage.—The best anchorage for large vessels is between Culebra bank and the red cliffs, with the light-house bearing E. by S.; small vessels can proceed farther in.

Landmarks.—**Morro Nispéral**, at $\frac{3}{4}$ of a mile inland from Nispéral point, rises to a height of 479 feet; it forms a part of a range of hills

extending to Baranquilla, at the foot of which the railway runs, connecting that city with Salgar.

When approaching Savanilla bay from the eastward, Morro Cupino, which is 558 feet high, and remarkable from its reddish cliffs, will be visible over the low land of Verde and Savanilla islands. Morro Hermoso, 508 feet high, and falling in steep terraces to Hermoso point, is also conspicuous. San Antonio fort, at the east end of the bay, is another prominent mark.

Directions for Savanilla.—In approaching Savanilla bay from the eastward, the coast should not be approached within 2 miles, to avoid the bank of 4 fathoms north of Verde island; Verde island, being very low, should be kept at some distance, until Hermoso point opens well to the westward of it, when haul in towards the bay. Bring point Hermoso to bear S. and run for it; when the light-house bears E. ¾ S. steer for it, keeping a sharp lookout for the *red* buoy on the tail of Culebra bank, and being careful to pass south of it. After passing Culebra bank, look out for the buoy, near the 20-foot rock, lying W. ¼ S., $1\frac{3}{10}$ miles, from the light-house, and take up anchorage as convenient.

A sailing vessel will generally have to work in; therefore when standing towards the main, San Antonio point must be kept open of Nispéral point, to avoid the Cupino bank; and in reaching to the northward, San Antonio point must not be brought to the eastward of ENE., to avoid, the Culebra.

The south side of the bay of Savanilla should not be approached within $4\frac{3}{4}$ fathoms.

Boats going from the anchorage to Salgar should keep the starboard shore close aboard, leaving all stakes on the flats to port.

At night.—Vessels, before proceeding eastward of Morro Hermoso, should bring the light to bear E. ¾ S., and steer in on that course, and when in 5 or $4\frac{3}{4}$ fathoms, anchor. Hard sand bottom on the north side, and gravel or shell on the south side, indicate approach to shoaler water.

Tides.—There is no regular tide in Savanilla bay, but the water sometimes changes its level 4 or 5 feet.

Caution.—As no complete survey of Savanilla harbor has been made, and the banks appear to be subject to change, the chart must be used with caution. The positions of the buoys in this harbor are not to be depended upon.

Damas bay.—From the bluff headland of Hermoso point, the coast trends S. by W., 5 miles, then westward for 2 miles, to the Morro de Damas, forming the bay of that name. About midway between the head of this bay and Hermoso point, is the little hill of Inasco, and nearly abreast it, not far from the shore, is the Cascavel shoal.

Nautilus shoal.—H. M. S. *Nautilus*, in 1821, being $3\frac{1}{2}$ miles from the nearest shore, with Hermoso point bearing about ENE., distant 5 to 6

miles, struck on a sunken rock, not three times the size of the ship; it had 11 feet water on it and 6 fathoms around. Its true position is, however, very doubtful, for in a subsequent account it is said that Hermoso point bore NE.

The Coast, from the Morro de Damas, trends SW. by W., 11 miles, when it curves to the westward for about 10 miles, to Galera point. The latter portion forms a narrow sandy neck of land, so low that in some parts the sea in strong breezes washes over it. Off all this part of the shore the water is said to be shallow, and there are 26 fathoms, muddy bottom, 9 miles from the land.

Caution.—In leaving Cartagena at night for the eastward, care must be taken to keep well to the westward, until to the northward of Galera point, as the current sets strongly into the bay.

Palmarito bank, situated about 3 miles from Morro Pelado, and W. ½ S., about 10 miles, from Morro de Damas, is a dangerous shoal; its exact position, however, is very doubtful.

It is said the soundings here are very regular, increasing from 7 fathoms, close to the shore, to 50 fathoms; that good anchorage will be found from 3 to 4 miles off; and that in working to windward, it is advisable to keep tolerably close along this shore, to obtain smooth water, and avoid the northwest current.

Lesseps shoal, on which the *Ferdinand de Lesseps* struck 24th March, 1883, when proceeding from Colon to Savanilla, has depths of 16 to 18 feet, black sand, and an extent of about ¼ of a mile; it lies with Cerro del Piojon in line with Volcan de Tierra Firme; Cascajal islet S. E. ½ E.; Pte. de Canoas S. ¼ E.

Caution.—It is stated, that this dangerous shoal has been formed by an earthquake, since the disappearance of the island of Zamba; and that it extends more than 6 miles from the old position of point Galera.

Galera banks.—Between the bearings of W. and NW., and at the distance of about 2 miles from the extremity of Galera point, there are four small banks of black sand, with 5½ fathoms water; 7 to 10 fathoms between and within, over the same sort of bottom.

Galera de Zamba bay is completely sheltered from the northward, by the neck of land terminating at Galera point, and affords good anchorage. In the center, however, is Arena cay; indeed, some authorities state there are two if not four cays, and being elsewhere incumbered with shallow banks, it is difficult for a vessel to go far in, and requires very great attention to the lead. On the south shore of the neck of land, there are several mangrove bights, with a depth of 12 to 15 feet.

Landmarks.—The volcan is situated on the east side of the bay, and is a round hill with a flattened summit, about 75 feet above the sea.

Zamba hill is probably the Morro de la Venta on the south side of the bay, which appears double; there is also another remarkable hill in this vicinity, with the appearance of a barn, which is probably the Cerro del Bujio del Gato, on the southwest point of the bay.

Cascajal island lies S. $\frac{5}{8}$ E., 6 miles, from Galera point, and nearly 2 miles from the shore. At about N., $1\frac{1}{4}$ miles, from the island, there is a shoal of 2 fathoms water; N. $\frac{1}{2}$ E., $\frac{3}{4}$ of a mile, there is one of 4 fathoms; and NW. by W. $\frac{1}{4}$ W., about 2 miles, there is another of the same depth.

Bujio del Gato Banks.—The westernmost, and largest, of these banks lies S. by W., 7 miles, from Galera point. At $\frac{1}{2}$ mile, NNE., from the north end of this bank, is the northeast rock, or Uña del Gato; outside this shoal the depth gradually increases, from 7 fathoms to 14 fathoms at the distance of $2\frac{1}{2}$ miles. At $3\frac{1}{2}$ miles, NNE. $\frac{3}{4}$ E., from Canoas point, there is a dangerous rocky bank, of only 3 fathoms water, in the middle of Gato bay, called Baxo. During the night, a vessel should not approach this part of the coast within the depth of 20 fathoms, as it is very little known.

Canoas point, situated SSW., $14\frac{1}{2}$ miles, from Galera point, is low and rocky, but the land is hilly just within, and the shore is moderately high. Northeast from the point, and near the shore, is a hill with a flat summit, and several barrancas, or reddish-colored ravines, on its sides.

From Canoas point the shore trends to the eastward, for about a mile, and then curves to the southward, for 3 miles, to the base of three little hills or remarkable cliffs, named Cerros Morritos, whence it takes a SSW. direction, for about 5 miles, to the city of Cartagena; this latter part is a low mangrove shore.

Bajo Negrillo.—This dangerous rocky shoal is said to lie between SW. and SW. $\frac{1}{2}$ W., from $2\frac{1}{2}$ to 3 miles, or even more, from Canoas point; with the hill of La Popa at Cartagena bearing about S. by E., and the citadel of San Lazaro S. $\frac{1}{2}$ W., about $7\frac{1}{2}$ miles. It is about $\frac{1}{4}$ of a mile in extent, with only 2 to 5 feet water over the rocky heads, 3 to 5 fathoms between them, and 6 to 9 fathoms close around. The channel between it and the coast would be practicable were it not for three more sunken rocks, which make the passage dangerous.

The Cabeza is another dangerous small shoal, with only 2 feet water, lying SW. $\frac{1}{2}$ W., about a mile, from the southernmost of the Morrito hills.

Playa Grande is the name given to a large bank of soundings between Canoas point and the Boca Grande, with 9 fathoms water on it at 4 miles from the land, towards which the depth gradually decreases. On the west side of Tierra Bomba, the depth increases to 20, 30, and 40 fathoms, and at 400 yards from this island there are 6 fathoms.

Salmedina bank.—This dangerous bank, in the way of vessels approaching Cartagena from the westward, is 3 miles long, east and west, and nearly 2 miles broad. From the northeast extreme, in 6 fathoms, La Popa hill bears ENE. ¾ E., and the southwest extreme of Tierra Bomba, SE. by S.; from the southeast extreme, in 4 fathoms, La Popa bears NE. by E. ⅞ E., and fort San José in line with the sandy point at the south end of Tierra Bomba, SE. by E.

Cartagena harbor is the finest and most commodious port on the north coast of New Granada; large vessels can lie in great security, effect any ordinary repairs, and, if necessary, heave down. It is formed between the low mangrove shore of the main on the east, Tierra Bomba island on the west, and Baru island on the south, and is about 8 miles in length, from north to south; but its breadth varies considerably. Near the middle, the eastern extremity of Tierra Bomba stretches so far across as to nearly divide it into two large basins.

The city, which is the capital of the province, is situated at the north end of the harbor, on a low neck of sand about 2 miles in length, and is inclosed within fortified walls of the most solid description; the churches and other buildings are also of a similar substantial character. The population is about 12,000, one-half being colored. It occupies a space of about ¾ of a mile, north and south, and ½ mile from east to west, and communicates with the main by a wooden bridge about 250 yards in length, and with Calamar, on the river Magdalena, by a canal or "dique" having a depth of 8 feet. Everything about the city is neglected, and the Government buildings, as well as others, are in need of repairs. There is one wharf or landing, but vessels are loaded and discharged by means of cargo barges.

The principal exports are cocoanuts, tobacco, fustic, rubber, hides, divi-divi, cotton and cotton-seed, balsam, cattle, and coffee. The canal is of great importance to the city, as by means of it the bulk of the exports are brought from the interior, either by boats or small steamers.

About a mile eastward of the city lies La Popa hill, 510 feet above the sea, of a wedge-like form, with the thick end to the south; at this end there is a signal-post and a large convent, the massive white walls of which are 40 feet high. In clear weather the hill may be seen from a distance of 30 miles, and is a remarkable object when off Galera point.

At the base of La Popa, between it and the city, on a small hill 125 feet high, are the ruins of the castle of San Lazarus; and at the entrance of the small lagoon, which separates the city from the main and the harbor, is Pastelillo fort. Vessels of large draught will find depths of 6 fathoms within 200 yards of the latter fort, but inside the little lagoon, between it and the city, there is only sufficient water for small craft drawing 6 feet, which can lie alongside the walls of the city.

The bottom of the harbor being soft mud, the water assumes a sort of green or olive tint, and shoals of 3 and 4 fathoms are consequently

difficult to discover; but those with a depth of 6 to 12 feet are easily seen.

Anchorage.—There is good anchorage on the flat in front of the city, with La Popa hill bearing E. or E. ½ S., and Canoas point NNE., in 5 to 7 fathoms water, 2 to 3 miles from the beach. It is said that the depth of water is decreasing on this flat.

Light.—From a light-house situated on the tower of the disused convent of La Merced, is exhibited a *revolving white* light, with *flashes* every 15 *seconds;* it is elevated 160 feet above the sea, and should be visible, in clear weather, from a distance of about 15 miles.

Approaching Cartagena from the northward, the light should not be brought southward of the bearing S. by E. ½ E., until past Canoas point. Approaching from the westward, the light should not be brought northward of E., in order to pass northward of Salmedina bank. From the anchorage off Santo Domingo gate, Cartagena light-house bears E. by N., distant about 2 miles.

Pilots may be obtained off the Boca Chica.

Provisions can be obtained, but at very high prices; they are imported chiefly from the United States. Fresh beef and vegetables are to be had.

Water.—No streams flow into the harbor, and well-water is slightly brackish. The inhabitants have tanks to their houses for rainwater, and it can be purchased from them, but the charge is enormously high. Vessels of war may obtain it, by permission, from the Government tank, near the magazine, at the west end of Manzanillo island.

Tierra Bomba island is 4 miles in length from north to south, 3¼ miles across at its greatest breadth, and 285 feet high in the center. Its north and south extremities terminate in low distinct points, and formerly the channels into the harbor were immediately to the northward and southward of them, and were called the Boca Grande and Boca Chica.

The Boca Grande, which was between the north end of Tierra Bomba and the sandy arm on which the city stands, has, however, been closed up by an artificial barrier a mile long, formed of large limestone blocks, which have not yet been consolidated by the *débris* and silt, and are therefore capable of being removed, if necessary.

The Boca Chica, at the south end of Tierra Bomba, between the low sandy points forming the southern extremity, and the mangroves which form the north end of Baru island, is about 500 yards wide, and is readily recognized by the forts on either side, which are capable of mounting altogether 60 guns. Fort San Fernando stands NE., 350 yards, from Sandy point, and has a flagstaff and signal post. The fort of San José rises from the water about 250 yards, NE., from the north

end of Baru. Sandy point is steep-to almost alongside, but from Baru a shallow ledge extends to the northward, which renders the channel tortuous, and contracts it to 200 yards in width at the entrance, from whence it gradually opens out into the harbor.

Between Baru island and the main, there is a navigable channel for large bongos, which enables them to pass from the bight of Barbacoas into the harbor.

Directions for Cartagena harbor.—The only danger in the immediate vicinity of Cartagena is the Salmedina, the inner edge of which is 3 miles from the west side of Tierra Bomba. Vessels approaching from the northward, however, must be extremely cautious in passing Canoas point, from the uncertainty which still exists in the position of the Negrillo. They should pass inside the Salmedina, which is safely done by keeping at only a short distance from Tierra Bomba, which is steep-to.

In the windy months, from January to June, the sea breeze generally sets in from the westward, and drawing round to the northwest and north, establishes itself in a direction along the shore about noon, or before, in the months between May and November.

Taking advantage, therefore, of the first of the sea breeze, and having opened out the Boca Chica, Sandy point should be brought midway between the forts San Fernando and José, in line with the center part of a long ridge on the main, bearing E. ½ N. Sandy point must be rounded close, within half a ship's length, and hauling up gradually, a course must be shaped in mid-channel, the edges of the banks on both sides being easily seen.

The north end of San José spit should be rounded at the distance of about 100 yards, with the flagstaff of San Fernando kept midway between the first tower to the northward of the gate of the fort, and the first embrasure to the northward of that tower; the course must then be altered to about ESE., passing southward of the Carreya shoal beacon.

The beacons or stakes, marking the shoals, are 4 feet high, painted white, and surmounted by triangular marks, with the number 15 painted in black figures on each; these stakes stand in 15 feet water.

The wind may permit the northern basin to be entered by the channel between Tierra Bomba and the Santa Cruz shoals; and the magazine on the west end of Manzanilla island open its breadth to the westward of fort San Lazarus, leads between them, but near 4 fathoms; within this the breeze will generally be adverse, and if going up to the city, unless in a small vessel, the assistance of a pilot should not be dispensed with, for the water is so muddy that the edges of the banks are not well distinguished at a greater depth than 12 feet.

A part of the Santa Cruz shoal, which is of coral formation, is now at times 6 inches above the water, where formerly there was a depth of

9 feet. It is also said that the San José ledge has grown up in like manner.

Should the wind have established itself to the eastward of north, before entering the Boca Chica, a vessel will not be able to fetch round the San José ledge, and it will then be necessary to shoot as far inside Sandy point as possible, to an anchorage, and warp up through the narrows.

In running out of Cartagena harbor, La Popa must not be opened to the westward of the southeast hill of Tierra Bomba before the buoys of the Boca Chica are made out. Vessels drawing more than 18 feet, must be cautious of a small knoll of that depth, which lies nearly in the center of the southern basin, with the flagstaff of fort San Fernando, W., and La Popa just open to the eastward of the east extreme of Tierra Bomba.

Tides.—It is high water, full and change, in Cartagena harbor at 11h.; springs rise 1½ feet, neaps 1 foot. The stream runs in and out of the Boca Chica at the rate of about a knot an hour, and over the barrier of the Boca Grande at about half that strength; but in the interior it is scarcely felt.

Baru island is about 13½ miles long, in a SW. and NE. direction, and is everywhere low and wooded, the tops of the trees being only about 40 feet above the level of the sea. To within about 4 miles of the southwest point, the western shore is clear; but here, abreast the farallon or islet of Perico, it is skirted by the Rosario islands.

Rosario islands are a group of small, low, woody islets, extremely dangerous of approach. The reefs extend to the westward about 9 miles from Perico; they should, therefore, be given a wide berth, and no stranger should attempt to sail among them. To the southward of the islets, however, there is good sheltered anchorage from the trade wind.

Arenas, which is the easternmost islet, is scarcely 1½ miles from Baru, but the channel between the reefs on either side is only about 100 yards wide, and lies on the Arenas side. It has not less than 4½ fathoms water, but is so tortuous, that to navigate it from the southward, a vessel must warp through, for the current runs strong from the northward; and the eye must be the guide.

At about 4 miles, W. by N., from Arenas, is Rosario island. Not far to the northward of this is Larga or Long island, which is the largest of the group, and lies about 3 miles to the westward of Perico; the shoals at the west end of the islet extend to the westward of Rosario.

About 3 miles to the northward of Larga is Tesoro. Foul ground extends from the west end of this islet to a considerable distance, and between it and Larga there are 17 to 25 fathoms, sand and rock.

Rosario banks.—At 3½ miles, WNW. ½ W., from Rosario islet, lies a bank of rock and sand with 6 to 7 fathoms water over it; and SW. by

W. ½ W., 2½ miles, from the islet, there is another of the same character, with 5 fathoms.

Tortuga banks lie respectively SSW. ½ W., 7 miles, and SW. ½ S., 10 miles from Rosario island; the NE. shoal has 4 fathoms on it, and the SW., 7 fathoms, with deep water between them.

General directions.—On examination of what has been stated respecting the winds that are experienced on this coast, between Trinidad and cape La Vela, it would appear that nothing further need be added to the description already given, to enable the navigator to prosecute his voyage with the greatest safety; in fact, as there is in this space only the general breeze or trade wind, neither hurricanes nor hard Northers are to be feared; the first being absolutely unknown, and the second, if they do at any time occur, never exceed the strength of the ordinary breeze.

If, in the rainy season, that is, from May to November, there are sometimes strong southerly winds and heavy rain, they must be considered rather as squalls of short duration, and as they blow off shore, do but little injury. This part of the coast, therefore, may be considered as a continued harbor as far as climate is concerned; and no more is necessary to enable the mariner to avoid every danger, than a reference to the description given, for the loss of a vessel upon it has been very rarely the effect of a storm.

As the breezes, especially from Aguja point, or rather from cape San Juan de Guia, are exceedingly strong—so much so that they may be considered as real gales—and as the wind blows from S. and SW., from June to November, it becomes necessary to present some rules for making the different harbors westward of cape La Vela.

It being a general rule on this coast, as well as in the whole of the Caribbean sea, to make the land well to windward of the port of destination, to prevent the trouble and delay consequent upon getting to leeward of it, vessels being once within this sea, and intending to anchor at either Margarita, or Cumaná, should close with the coast about cape Three Points, or cape Mala-Pasqua, passing in preference through the channel between Margarita and the main land. This route also appears preferable if bound to Barcelona, although there certainly can be no inconvenience in going to the northward of Margarita.

Vessels bound to La Guayra, from Cumaná or Barcelona, should shape a direct course for cape Codera, passing always between Tortuga and the coast; but those coming from Europe, or any of the windward islands, to that port, should navigate to the northward of Tortuga, to approach the coast about the same cape, or a little to leeward of it, taking care to sight the Sentinel rock, which lies to the northward of the cape. If bound to Puerto Cabello, it will not be so necessary to make cape Codera, as any other point on the coast will answer the same purpose, provided it be sufficiently to windward of their port.

To make cape Codera, or any harbor upon the coast to leeward of it, a vessel may pass through any of the channels between the islands to the northward of the coast; in doing which, nothing more is necessary than to attend to the description of the one taken.

Vessels bound to Maracaybo, from the eastward, should sight cape San Roman, and those from the westward, should make Espada point. In running for cape San Roman they may pass either to the northward or southward of Curaçao.

Should the navigation to cape San Roman be taken outside the islands, it should be recollected that the Roques and the Aves isles are extremely dangerous on their north sides, and that the northwest end of Buen Ayre may be mistaken for that of Curaçao.

To avoid these dangers and risks, especially in the night, every pains should be taken to check the latitude as often as opportunities occur. Due attention to these remarks is very important, as the currents in this part of the sea are strong and variable.

Vessels bound to Santa Marta or Cartagena should navigate outside all the islands, so as to make that of Oruba, and the land about cape La Vela; having obtained sight of the latter, they may, with safety, steer direct for Aguja point, in order to reach the anchorage of Santa Marta, as before directed.

Those which, without touching at Santa Marta, go on to Cartagena, should shape a direct course from Aguja point, to pass outside Cay Verde off the mouths of the Magdalena; whence, by passing about 5 miles to the westward of Galera point, and about 4 miles from Canoas point, they may proceed direct to the Boca Chica, or else anchor on the bank of Playa Grande, if not able to effect an entrance into the Boca Chica with daylight.

Calculation ought to be made, in order that the distance may be proportioned to the rate the vessel sails at, so as to take the Boca Chica by day, or anchor south of Canoas point, or on the Playa Grande, in order, if possible, to avoid the necessity of standing off and on for the night, and thereby saving much trouble, and wear and tear to the ship and rigging, in the time of the strong breezes; but if there be no means of avoiding it, the position must be maintained by short tacks off and on; or if the wind and sea will permit, by coming to anchor. By following the above route the various shoals and dangers lying between cape La Vela and Aguja point will be avoided, as well as those lying between Galera and Canoas points; among which no vessel ought to go, and, when in their neighborhood, too much attention cannot be paid to the soundings.

In the season of the rains, or during the Vendavales, a vessel for Cartagena, from any place to the eastward, should, after passing cape La Vela, keep on the parallel of 12° N., or somewhat more, in order to retain the wind until she arrives at long. 76° W.; then steer S., coming up by degrees to SE. on getting into the limits of the rains; observing also that it is better to make the land to the southward of the

Boca Chica, than to the northward of it; because in this season the current sets strong to the northeast, though in the season of the freezes it runs to the southwest. Particular care should likewise be taken not to run towards the land by night, for at such times it is hazy, and the outlying shoals and islets are dangerous to approach.

In working to windward on this coast, from Cartagena to Margarita or Trinidad, a vessel should make the boards as long as convenient. The proper time for tacking ought to be decided by the daily variation of the trade wind, which, about midnight or somewhat sooner, comes off shore from about ESE. or even SE., if it has been raining heavily before, and the ground is soaked; and from 9 to 11 in the forenoon, the sea breeze comes in from ENE. At all distances from the shore, these variations take place, and the navigator may and ought to take advantage of them in working to windward. If, on account of nearing the land, a vessel cannot continue on the same tack until the wind changes, short tacks sould be made along shore, until it again veers to the SE., and then again stand out to sea. By these means two long stretches may always be made, one to the NE., the other to the SE., that is to say, both of them within 8 points of the compass. By working to windward on short tacks along the shore, this advantage cannot be obtained, because the wind always blows along the coast; unless sometimes there may be a light land wind in the night, and before the sun rises during the season of the rains; but they do not last, and such variations afford but little assistance.

Small vessels cannot proceed upon this system when the breezes are very fresh, which, from Aguja point to Fuerte isle, are like storms, with a rough sea, so that they cannot make any way; in these cases it is most advisable for them to keep in near the coast, where the water is smoother. But large vessels well equipped, and capable of resisting these gales, or when the winds are moderate, ought to make long stretches when the wind will admit of it, in the manner already pointed out.

On the coast of Cartagena the easterly breezes do not begin until the end of November, and generally blow with little strength until the middle or end of December, from which time they are powerful both day and night; they frequently, but not always, moderate a little between sunrise and 9 or 10 in the morning, when they recover their ordinary force. Very near the coast, especially if it be high, they are often found moderate at the dawn of day, and at sunrise veer to ENE. until 9 or 10 o'clock, when they again blow in their usual direction, which, on this coast, is from NNE. to NE. Of these variations, those who are acquainted with the coast, and sail near it, may take advantage, and it may be better at nightfall, even for large vessels, to anchor at the various points that offer.

A vessel which attempts to get to windward outside, will not accomplish it without great difficulty and damage, as much from the strength of the wind, as because the sea is very rough and short, as far as 20 or

120 miles from the land, when it becomes longer; and because, being forced in the night to reduce sail, and the current drawing round towards the northwest quarter, it results that the little gained by working inshore will probably be lost.

Some authorities, however, state that, with violent trade winds, it will be more advantageous to turn to windward, close to the shore, to avoid the heavy sea and northwest current. But, with light variable winds in the rainy season, it will be better to keep the land 12 or 15 miles distant, where an easterly current may at times be found.

Vessels bound up to Cartagena, from the westward, should take advantage of the strong eddy which runs to the southeast and east, along the coast all the way from Grey Town, at the distance of about 30 miles, and which will enable them to work up rapidly. On the contrary, when bound westerly to Aspinwall or Grey Town, it will be more prudent to avoid this stream, by keeping to the northward of the parallel of 10° N., where the breeze will also be more steady and regular, and the sea less rough.

Those coming from North America, to any of the ports to leeward of Curaçoa, should enter the Caribbean sea by the Mona passage; and, if to the ports situated to windward of that island, by the channels eastward of the Virgin islands.

From the gulf of Mexico or Jamaica, it will be necessary to beat well to windward, according to the seasons. In that of the breezes, Cartagena may be fetched from Port Royal, Jamaica; but in that of the variables, it will be more advantageous to work up to the west end of Haiti, or even as far up as Alta Vela, if bound to Maracaibo, before attempting to stretch across.

Barbacoas bay, or little gulf of Barú, is about 12 miles deep, in a northeasterly direction; and the entrance is about 6 miles wide, between the southwest end of Barú and Barbacoas point. The shore all round is bounded by low mangroves, and the main land is intersected by numerous creeks communicating with large lagoons, and streams out of the Magdalena, navigable for large bongos, which enter the harbor of Cartagena by means of the Caballos channel.

The soundings decrease gradually from 10 to 3 fathoms, which latter depth will be found about 3 miles from the eastern shore; and the bottom, being sand and soft mud, affords good and well sheltered anchorage.

Barbacoas shoals.—Great care, however, must be taken when working into Barbacoas bay, to avoid the shoals which extend from the Rosario islands, and from Barbacoas point. The outermost of the latter shoals lies with the southwest end of Barú bearing W. ¼ S., Barbacoas point, SE. by E. ½ E., and the southeast point of the mainland, S. ½ E., and has 15 feet water over it, with 6 fathoms close to. Another of 12 feet lies NW. ½ N., a mile from Barbacoas point; and there is also one of 9 feet, W. by S., 2⅓ miles, from the same point.

Atillo and Matunilla shoals are situated farther in the bay. Atillo is a rock with only a foot of water over it, lying NNW. ½ W., 3½ miles, from Barbacoas point; and Matunilla, which is also very shallow, bears NNE. ¾ E., nearly 5 miles, from the point.

The coast from Barbacoas point trends about south, 15½ miles, to the Morro or bluff of Tigua, which is readily distinguished by the little hill that crowns the summit, being higher than any other on this part of the coast.

From the Morro of Tigua, the shore trends SSW., 12 miles, to San Bernardo point; a short distance inland will be seen the Cerros de Chichiman, which terminate to the southward near the shore, at the Pico del Rincon, about 6 miles from San Bernardo point.

San Bernardo point is the southwest extreme of a submerged mangrove cay; and between the cay and the coast there is a small channel named the Boqueron, navigable for canoes and bongos.

Comisario bank.—From the Morro de Tigua, a shallow bank extends in a N. by W. direction, about 4 miles, terminating about 2½ miles from the shore, abreast Comisario point, which is the first small projection to the northward of the bluff.

Jesus and Cabruna islets.—These two small cays lie at only a short distance from the coast; the first about 3 miles to the northeastward of San Bernardo point, and the other about a mile farther on in the same direction.

El Pajarito bank.—At about 2 miles, S., from San Bernardo point, lies a rocky bank, named El Pajarito, having from 3¼ to 4¼ fathoms water.

San Bernardo islands, a number of small, low rocks and wooded cays, surrounded by several shallow banks, occupy a space about 12 miles in extent, east and west, and 10 miles, north and south. Salamanquilla, the easternmost cay, lies NW. by W., about 4 miles, from San Bernardo point; and Tintipan, the northernmost, and largest, is about 10 miles in the same direction from the point.

Between the bank which borders the east and southeast side of Salamanquilla, and the bank bordering the west side of Cabruna cay, there is a navigable but intricate channel, about 600 yards wide in the narrowest part; and there are various little cuts between the cays and rocks, that may be used by those locally acquainted. The bank extends westward and southward from the cays to a considerable distance, and is very dangerous, the rocky heads being steep-to.

At 4 or 5 miles SSW. ½ W. from the cays, there is a sandy shoal, with only 3 fathoms water; and shallow spots are supposed to exist still farther out. H. M. S. *Isis* grounded here in 1826, but it is not stated whether the bearing is from the north or south cays.

Caution.—The San Bernardo islands have been mistaken for the Rosario group, although they are 21 miles apart; the latter, however, consists

of only three cays, whilst the former has eleven large ones scattered about in a much greater space; and when seen bearing from E. to ESE., 10 or 12 miles, several parts of them appear like small rocks lying between the larger islets. At the south end of Tintipan, there are two remarkable trees, which may be mistaken for the masts of a vessel at anchor.

Current.—The current is frequently found setting strong to the east and northeast, close to the San Bernardo islands.

Directions.—The course through the Salamanquilla channel is about SW., and the depth in the middle is from 9 to 12 fathoms, with 5 fathoms on the edge of the banks. When bound through, from the northward, having passed to the westward of the Rosario islands, a vessel should steer towards the Morro de Tigua, bearing in mind that the shallowest Tortuga bank bears NW. ½ W., about 19 miles, from that hill, which will be a sufficient guide to avoid it.

The best part of the passage between Cabruna and Salamanquilla lies toward the latter island, and should the weather be clear, the edges of the shoals on both sides may be seen from aloft, and the vessel piloted by the eye; but, if otherwise, the lead will be the only guide, great caution being required.

When navigating outside the Bernardo shoals, great attention is necessary, and the islands ought to be kept 6 miles distant, until San Bernardo point bears ENE. ½ E.

Gulf of Morrosquillo.—Between San Bernardo point and Mestizos point, which bears SSW., 17 miles, from it, the coast sweeps inwards, forming a bight from 8 to 10 miles deep, in which there is good anchorage in every part, in the season of light winds; and in that of the breezes, under the north shore within the Pajarito shoal. On a line between the two points, the depth is about 14 fathoms, whence it gradually decreases to the shore, bottom green ooze, and free from danger.

Near the head of the gulf, and SSE., ½ E., 13 miles, from San Bernardo point, is the town of Santiago de Tolú, which is situated close to the sea, on a plan skirted by extensive savannas, bounded on the east by a chain of mountains. One of the peaks, rising above the others, forms two remarkable hummocks named the Tetas de Tolú, which bear E., 12 miles, from the town, and are good guides for it, as well as useful objects in navigating this part of the coast.

On the south side of the gulf there are two more ridges of high land, which rise from the shore to considerable elevation not far in the interior. The easternmost, named Cerros de Santero, and the westernmost, Cerros de Cispata, which are not so lofty.

Port Cispata.—The low neck of swampy mangrove land terminating at Mestizos point, forms the west side of the entrance to port Cispata, between which and Zapote point on the east, is about a mile wide, with a depth of 4½ fathoms. Within this it opens into a secure basin, ex-

tending to the southwestward about 7 miles, and 2 to 3 miles wide, with a depth of 4½ to 6 fathoms; two shoals of 2 fathoms lie near the east side.

On that side, at the foot of the Santero hills, about 2 miles inland, is the village of Santero, and at the entrance of the valley, between the Santero and Cispata ridges, is the village of Lobos.

River Sinu.—At the northwest end of port Cispata are the mouths of the river Sinú, which, winding round the southern side of the port and the base of the Cispata hills, is navigable for canoes to a considerable distance. Within the bar there is a depth of 3 fathoms up to the town of Santa Cruz de Lorica, which stands on the right bank on the southeast side of Cispata hills.

Directions for port Cispata.—Vessels bound to port Cispata, having passed inside or outside the Bernardo islands, will be guided by the Cispata hills, which bear about S. from the entrance. Those proceeding to Tolú will in like manner be guided by the peaks of that name. The best anchorage in port Cispata will be found under the northwest shore, between Balandra point and Navíos point, at about 2 miles west of the entrance. The only danger inside to be avoided is a small patch of 9 feet, off the south shore, the north end of which bears SE., a mile, from Balandra point.

The coast from Mestizos point trends WSW., 10 miles, to Viento point, and is very low, but covered with high mangroves. About midway is the entrance to the Venados lagoon. The shore is all along foul to a considerable distance. North, 3½ miles, from Viento point, there are only 3½ fathoms, and at the same distance to the northwest of that point there are 5 fathoms water.

From Viento point the shore curves slightly inwards to Piedras point, bearing SW. by W., distant 7 miles. This point is the eastern extremity of a bold scarped headland of moderate height, which trends about SW. ½ S., for 4 miles, and terminates at Rada point. Near Piedras point, a small bay is formed, and about 400 yards to the northward of it there is a small high rock, with some shoals ½ mile northwest of it. These shoals extend nearly a mile northeast and southwest, and have some rocks above water, with others which uncover only at low water; elsewhere the depth is 1½ to 2 fathoms.

Fuerte island, situated NW. by W. ¾ W., 6½ miles, from Piedras point, is about 1¼ miles long, north and south, and 1 mile broad; it is covered with trees, and the royal palms in the center, overtopping the others, are visible from a distance of 20 miles. The island is surrounded by reefs and scattered rocks, some of which appear above water, and on the banks outside them there are from 2 to 4 fathoms water, over rock and sand. At 1 mile, S. by W. ½ W., from the south side of the island, there is a small sand-bank of 4½ fathoms, and SE. by S., about

the same distance from Arenas point, the southeastern extremity of the island, there is another of sand and gravel, with 5½ fathoms water.

In the passage between Fuerte island and the main, there are 6 to 14 fathoms, but it must be navigated with great attention on account of the shoals off Piedras point.

The coast between Rada point and that of Broqueles, which bears SW., about 5½ miles from it, is low and sandy, and forms a shallow bay, having a depth of 3¼ fathoms on oozy bottom, about ¾ of a mile from the shore. Broqueles point is a low rocky projection, from which a reef extends 400 yards to the northward, and a short distance from this reef is Toro shoal. At about 1½ miles, SW. by S., from Broqueles point, there is a small rocky islet, named Farallon.

At 4 or 5 miles in the interior are the Cerros de Rada, a ridge of hills extending in a northwest and southeast direction, having three remarkable peaks, the highest of which rises about 5 miles southeastward from Broqueles point.

The coast from Broqueles point to the remarkable bluff or hill of Tortugon, trends SSW., 14 miles; and is bold, low, and sandy, except about midway, where the little hill of Cruz rises from the shore.

A small, low, woody cay, named Tortuguilla island, lies W. ½ S., 4 miles, from Tortugon bluff; a reef extends to the northward from the cay, but between it and the bluff there are 5 and 6 fathoms.

From Tortugon bluff the shore trends, with a slight bend, SW., 12 miles, to Arboletes point, which is low and woody; in this space the soundings become less, and about 3 miles to the northward of the latter point, and the same distance from the beach, thre are only 3 fathoms. San Juan point, the next projection, is high and scarped, and lies SW., 8½ miles, from Arboletes point; between them the low, sandy shore forms a deeper bay, and abreast the middle of it there are only 3 fathoms water at 4½ miles from the beach.

From San Juan point the coast trends in a SW. by W. direction, for about 9 miles, to Savanilla point, which is low. In the interior, however, there will be seen a low range of hills terminating at the Cerros de Savanilla, about 4 miles to the southeastward of the point. About 1 mile southwestward of Savanilla point lies the Gigantones shoal, which, being near the shore, presents no danger.

Caribana point.—From Savanilla point the coast trends in a southerly direction, for about 5 miles, and about WSW., for 12 miles, to Caribana point, which is low and woody. At a short distance within this point is the Cerro Aguila, which, although of only moderate height, is remarkable from standing alone in the middle of low land, and is a useful guide.

Caribana shoals.—A ledge of shoal ground extends to the northward from Caribana point, and terminates about NW., 4 miles, from the point, in 4½ fathoms; not far from the point, in this direction, there is a

rock which partly shows itself, and outside it there is another with very little water.

In the same direction, 6 miles from the point, there are 9 and 10 fathoms on oozy sand; at 11 miles, 21 fathoms, ooze; and at 14 miles, 32 fathoms, ooze. Soundings extend to some distance from the shore, between Fuerte island and Caribana point, which renders it safely navigable, with proper attention to the lead, and it affords good anchorage in the season of light and variable winds.

Gulf of Darien.—The entrance to this gulf is formed between Caribana point and cape Tiburon, which are 29 miles apart; and from this line the gulf is 46 miles deep.

From Caribana point the shore bends abruptly to the southward, for about 3 miles, when it trends to the southwest, for about the same distance, to the northwest point of a low, sandy peninsula, about 2½ miles in breadth at the extremity, from north to south. The face of this peninsula is bold and steep-to, and may be safely coasted at the distance of a mile; the interior is occupied by the Aguila lagoon, about 5½ miles in extent, from east to west, in which are many mangrove cays.

From Arenas point, the southwestern extremity of the peninsula, the coast of the gulf trends in an easterly direction, for about 5½ miles, to the entrance of the river Soldado, thence SSE., 6 miles, to Urabá point. In the latter space the land is low, with a few small hillocks.

From Urabá point to the head of the gulf, the shore trends nearly south, 29 miles, and is very low and swampy, the only remarkable object being the little hill that forms Cayman point, 9 miles from Urabá point. The soundings are regular, and this shore may be easily navigated with proper attention to the lead. The head of the gulf is about 10 miles in breadth, and the river Suriquilla flows into the middle of it.

The western shore of the gulf, for the distance of about 20 miles to the northward of the head, is low, swampy, and irregular; being formed by the delta of the river Atrato, which enters the gulf by numerous branches, eight of which are navigable for canoes and bongos. At the outermost part of the delta, 25 miles to the southward of Arenas point, the gulf is contracted to a width of only 4 miles.

The river Atrato, probably the fourth largest river in volume in South America, rises in a spur of the Antioquian range that connects the latter with the divide, or Cordilleras of Darien. Flowing on a course generally north, for several hundred miles, it empties, through thirteen mouths, into the gulf of Darien. It has numerous tributaries on both sides. This river was surveyed by Commander Lull, U. S. N., for 160 miles, or as far up as the mouth of the Bojaya. Its banks are low, and for the whole of this distance, during the wet season, are overflowed to a depth of 3 or 4 feet, from which cause all of the houses are built upon piles. Below Sucio there are no habitations upon the banks, as they are submerged ten months of the year. This river resembles the lower Mississippi in grandeur of proportion, with its long reaches, its

width, varying from 500 to 825 yards, and its great depth, often exceeding 10 fathoms. Its current varies from 2 to 3 knots per hour, which would be much increased in the rainy season but for the overflow of the banks, which permits an escape of the surplus water by spreading for miles over the adjacent country.

The survey was made in a row-boat, floating down with the current, and nowhere in the channel were found less than 28 feet. Over the whole distance surveyed, no rocks were found; the bottom was muddy, and the river unobstructed by snags. So well defined is its channel, and so free from obstructions, that a single passage up and return would be sufficient to make one acquainted with the navigation.

The mouths of the Atrato are obstructed by bars, upon which there will not be found more than 6 feet of water. They differ in character, however, according to their protection from the sea. The Uraba mouth, being farthest from the sea, and also protected by a long sand-spit, is fixed in its nature, and the bar is of hard sand. These bars, as they increase by fresh deposits, extend out, and break off abruptly from 2 fathoms to 10 fathoms.

The extensive delta projects far beyond the limits of the mainland, and banks composed of a deposit of the softest ooze, extend about a mile outside the bars; exposed, however, to constant changes, especially during the season of the breezes.

Candelaria bay.—On the north side of the delta of the Atrato, there is a bight about 2½ miles in extent, named Candelaria bay. The land around; however, is so low that the greater part is inundated, even at low water; and it is bordered with mangroves, reeds, and rushes, so that only the northwest part of the bay appears dry. A sand-bank skirts the whole circuit of the bay, and extends a mile to the southeast from the northwest point, which reduces the entrance, between it and the mouth of the little Faisan branch of the Atrato, to scarcely a mile in breadth. Off the mouth of the Faisan, and along the southeast side of the bay, however, the bank does not reach to more than about 300 yards from the shore, leaving a space of good anchorage about 1⅓ miles in extent.

The bar of the little Faisan has 3 feet of water upon it, and it is one of the best branches by which canoes enter the Atrato.

Directions for Candelaria bay.—To enter Candelaria bay, great attention is required to the soundings, care being taken not to shoal to less than 17 fathoms in the entrance, nor 12 within. This caution is absolutely necessary, for the sand-bank that skirts the shore is so steep that it shoals suddenly from 13 to 5 fathoms, and from 5 to getting aground. By preserving a proper depth, a vessel will pass about 800 yards from the southeast point, and, having entered, the discolored water on the edge of the bank may be seen from aloft.

Tides.—The tide in the gulf of Darien rises 2 feet.

Revesa bay.—From the northwest point of Candelaria bay, the low mangrove shore trends about N. by W., 5 miles, to Revesa or Chocó point, which, projecting a little to the eastward, affords off its south side, good anchorage with northerly winds. The shallow sand-bank extends a considerable distance, but gradually disappears as Revesa point is approached, so that vessels entering the Revesa anchorage may pass within 300 yards of that point, and anchor as soon as it bears eastward of north in 13 or 14 fathoms.

The west coast of the gulf of Darien, from Revesa point, trends about west, for 6 miles, forming the northern boundary of the delta of the Atrato. The principal mouth of the river opens out about 3 miles to the westward of the point, but being so exposed to the breezes, the commerce is more conveniently carried on by means of the little Faisan branch, which has the advantage of the adjacent anchorage in Candelaria bay.

The sand thrown out of the main branch is deposited at a long distance, and this part of the coast should not be approached nearer than 2 miles.

From the northwestern extremity of the delta, the shore trends about NW. by N., 14 miles, to Tripo Gandi point, and becomes considerably elevated; and close off it lie numerous small islets.

In the bight, at 5 miles west of Revesa point, a hill named the peak of Tarena rises near the shore, and thence a lofty ridge, having several remarkable peaks, stretches in a northwest direction as far as cape Tiburon; the southernmost is named Candelaria, the center one Gandi, and the northernmost Pico de Cabo; the latter rises beyond cape Tiburon.

A group of islets, named the Tarena cays, lies close to the shore about $2\frac{1}{2}$ miles from the head of the bight. The Tutumate islets, three in number, lie about 4 miles northwest of the former, and $\frac{1}{2}$ mile from the coast. About 4 miles farther on is Tambor islet, lying rather more than $\frac{1}{2}$ mile from the shore; at about $\frac{1}{2}$ mile, N. by E. $\frac{3}{4}$ E., from it, a rocky shoal shows itself, between which and the islet there is a clear passage; it is, however, always better to pass outside. To the westward of Tambor islet, the shore forms a bay named port Escondido, which affords shelter for small vessels.

At about 3 miles, NNW., from Tambor islet, are the Bolanderos islets, which consist of one large islet, with several small ones to the southward of it, all of them clear and bold, and not farther than $\frac{3}{4}$ of a mile from the shore. At 3 miles, NW. by W. $\frac{1}{2}$ W., from the Great Bolandero, and $\frac{1}{2}$ mile from the coast, is the Piton islet, which is also steep-to.

From Tripo Gandi point, a low sandy shore trends WNW., about 6 miles, to Gandi point, forming Gandi bay.

From Gandi point to the entrance of the river of that name, the shore trends NW., about $1\frac{2}{3}$ miles, forming Estola bay, into which the little river Estola empties, but neither the river nor bay is of any importance. From the river Gandi, the coast takes a northwesterly direction, for about

12 miles, to cape Tiburon. Midway, about a mile from the shore, lies Tonel island, which is steep-to on its east side.

As already stated, the whole of the coast between the Tarena cays and cape Tiburon is high, bold, and clear of danger, but it is very wild in the season of the breezes. At this period the eastern shore of the gulf should be kept aboard, where good anchorage will be found, if necessary, and a smooth sea for working to windward.

Cape Tiburon, already mentioned as the northwestern extremity of the gulf of Darien, is rocky, high, and scarped; projecting boldly out to the northeast, forms on each side a small harbor. That to the southward of the neck is so narrow as to be of little use; but Miel harbor, on the west side, has good holding ground of sand and clay, in 11 to 12 fathoms water.

Anachucuna bay.—From cape Tiburon, the shore, consisting of a sandy beach, extends about WNW., 13 miles, to the point under the peak of Carreto, forming a bend about 2½ miles deep, named Anachucuna bay. At the northwest end of this bay, about 2 miles to the south of Carreto point, is the little harbor of Escondido, adapted only for coasting vessels.

Port Carreto.—On the west side of Carreto point, between it and some small islets lying about 1½ miles to the northwest of it, the shore curves to the southwestward, forming a bay about a mile deep, in which there are not less than 3, nor more than 8 fathoms water. Being exposed, however, to the heavy sea thrown in by the NE. breezes, it is only of use as an achorage in the season of light weather.

Carreto shoals.—To the northward of this port, about 1½ miles, are two small rocky banks near each other, on a NE. and SW. bearing, with 5½ fathoms over them, and 20 to 25 fathoms close around; but they break with fresh breezes.

Port Escocés.—Escocés point, bearing NW., 8 miles, from Carreto point, terminates at a small hill 260 feet high, but 3½ miles to the southward of it, the mountain ridge, which extends parallel to the shore, rises to the height of 1,180 feet, and about 7 miles to the westward, to the height of 1,985 feet. About 3 miles southeastward of the point, and about a mile from the shore, are three small rocky islets, named Las Isletas, and within them is a cay of larger dimensions.

Escocés point is the extremity of a narrow neck of land, about 2 miles in length in a northwest direction, which forms the northeast side of an inlet of irregular breadth, named port Escocés. In the center of the outer part there is a depth of 6 fathoms, whence it gradually decreases to 3 fathoms at the head of the inner arm.

The entrance is about ¾ of a mile wide, but the outer part is obstructed by the Escocés reef, 3 feet high, lying about ¾ of a mile to the westward of Escocés point; there is a channel on either side of it, but the western

is the better. The west and south sides of the reef are bold, but about 400 yards, NE. by E. ½ E. of it there is a small head with 18 feet water. With a strong northeast wind, the sea breaks across between the rock and Escocés point, also on the Middle reef, Antonio and Harbor rocks, in the interior of the inlet.

Water.—Several small rivulets of good water run into the south side of port Escocés, but they are sometimes dry, and landing is generally difficult. In a little sandy bay, about 3 miles to the westward of Escocés point, is the entrance of the river Aglatomate; and ½ mile further on, in Surf bay, is the entrance of the Aglaseniqua. These rivers are from 20 to 30 feet broad, and never dry, and the waters in both are excellent, but difficult to obtain in rough weather. When moderate, the best landing is under cover of the little reef at the mouth of the Aglaseniqua; but the most convenient place for watering is at the mouth of the Sasardi, farther northward. On the west side of the entrance of the Aglatomate there are a few bamboo huts.

Directions for port Escocés.—Vessels of heavier draught than 20 feet must approach the entrance to port Escocés with great care, for there are several coral banks in the offing, which, in heavy weather, are dangerous. The outermost bank, bearing E. by N. from Escocés point, and NNW., 1½ miles, from the outer Isleta, has 4½ fathoms; and another, bearing N. ½ E., 1¾ miles from the point, has 4 fathoms. Carreto peak kept open of the outer Isleta will clear these, and several other patches to the northwestward of them. Having rounded the Escocés reef within the distance of about 400 yards to the westward, the eye must be the guide, directing the course in mid-channel until nearly abreast the narrowest part of the entrance, between the old fort point and the opposite side, when the eastern shore should be kept aboard, to avoid the Middle reef, which may be seen from aloft.

Anchorage may be obtained as soon as convenient within the Middle reef; in entering the inner arm, the wind baffles so much, after passing Harbor rock, as to make it very dangerous, although there may be a strong breeze outside.

Caledonia harbor.—About 4 miles, NW., from Escocés point, lies Oro island, the easternmost and highest of a range of cays and rocks which lie from 1 to 3 miles from the mainland, and extend in a northwest direction about 5 miles. Between them and the main are two well-sheltered harbors, the easternmost named Caledonia, the westernmost Sasardi, which are only separated by a narrow bar with 12 feet water over it.

Oro island is 470 feet high at its eastern extremity; the edges of the reefs which skirt it, and the little cays and rocks extending a mile to the southward of it, to Piedra isle, always show themselves, and are steep-to. The Oro shoal, of 4 fathoms, which lies 400 yards from the eastern point of that island, also breaks in strong breezes.

Reventazones shoals.—The entrance to Caledonia harbor is ½ mile wide, but the approach is obstructed by three dangerous shoals, on which the sea breaks heavily in strong breezes, lying about a mile to the eastward of the cays, extending from the southwest end of Oro island. Mount Vernon, on the southeast point of entrance to the harbor, and Piedra isle, the southeasternmost of the cays (which is very small), in line, bearing about W. by S., will lead just clear to the northward of the outermost shoal, which has 3½ fathoms water. There are channels between the shoals, and between the southernmost and the main, all of which are clearly pointed out on the chart, but they are too intricate for a stranger to navigate.

Directions for Caledonia harbor.—Approaching Caledonia harbor, and having brought Oro island to bear about SW. ½ W. before Carreto peak comes over the outer Isleta (the line of the outer banks), Piedra isle must be brought in line with a remarkable hill, bearing SW. ¼ S., which mark will lead between the outer banks; the reefs which skirt Oro island must then be rounded at the distance of 400 yards, passing between them and the Reventazones banks. From abreast Rocky cay a vessel will generally have to work to windward, and, when standing to the westward, the south end of the sandy beach in Surf bay must not be shut in with San Fulgencio point, at the base of mount Vernon; nor must Rocky cay be shut in with Dobbin cay; when standing to the eastward.

These limits give a clear space of 8 to 10 fathoms water on mud, in any part of which there is good anchorage. If desirable to go farther up, as far as Scorpion cay, the eye must be the guide, observing that the bottom cannot be seen at a greater depth than 12 feet.

An entrance can also be made as far to the southward as to bring on the mark given before for clearing the north end of the Reventazones; but great care must be taken not to open mount Vernon to the southward of Piedra isle before these banks are passed, or the Oro rock is in line with Crag rock, the outermost islet.

In sailing out of the harbor, vessels will generally have a wind either from NNE., in the season of the breezes, or off the land, occasionally, in the wet months. It will be merely necessary to skirt Rocky cay and reef at a safe distance, and getting on the line of Piedra isle and mount Vernon, proceed to sea on that mark. Should the wind not admit of this, short tacks must be made towards and along the reef, until past the outer Reventazones shoal. In the event of missing stays when standing close to the Reventazones breakers, a thing very likely to occur from the heavy sea, it would be better to keep away, and pass to leeward of the shoal, than attempt to tack again. Vessels can also pass out along the shore to the southward of the Reventazones, taking care not to go outside the line between the west extreme of Dobbin cay and a remarkable solitary tree on Scorpion cay, NW., until the Aglatomate huts bear W. ¼ S., or the outer Isleta is just shut in with the north-

ern extremity of Escocés point, when the vessel may haul out to the eastward of those shoals.

Sasardi bay and harbor.—The Sasardi islands, the westernmost of the cays, are separated from Sasardi point on the main, by an opening ⅜ of a mile wide, exposed to the northeast. From Sasardi point, the coast sweeps round to the southwestward, forming a bay about ¾ of a mile in extent, near the center of which there is convenient anchorage for watering, in 4 to 6 fathoms. The river Sasardi, a little rivulet about 10 feet wide. and with 2 feet water on the bar, flows into the western side of this bay, and is the best place to obtain water; canoes manage to get up it, with some difficulty, about 2 miles; on the north side of the entrance there is a village.

In the interior of the bay there are several shoals nearly awash, and consequently easily avoided; and just within the line of entrance, about two-thirds the way across from Sasardi point, there is a hard, flat ledge about 400 yards in length, upon which the sea generally breaks. The channel to the eastward of this ledge is only 400 yards wide, with a depth of 4 fathoms; to the westward of the ledge, in mid-channel, there are 9 fathoms. The outermost of the banks in the immediate vicinity of the entrance has 3½ fathoms over it, and lies NE. ¼ N., 2 miles, from the western extremity of the Sasardi islands, with the northeastern extremity of Oro island just shut in with the Crag rock, bearing SE. by S. The land is here much lower than in the neighborhood of port Escocés.

Supplies.—The inhabitants of the village of Sasardi subsist by fishing and hunting, and the cultivation of plantains and cocoa; the latter article and cocoa-nut oil are exported in small quantities in American vessels, which give in exchange arms, ammunition, cotton, and culinary articles. No live-stock is to be obtained, but the sea abounds in fish, and plenty of turtle are caught in May and June.

The interior is densely wooded with trees of the most valuable description, growing to the height of 70 to 100 feet; among them are found the mahogany, cedar, silk-cotton, ebony, satinwood, rosewood, fustic, logwood, with many of the pine family, adapted for spars and masts. The Indians use cedar for their canoes, and a red wood called calli-calli, which is very hard and durable, notwithstanding the destructible effects of the worms and insects of this climate.

Water.—As already stated, the river Sasardi is by far the most convenient place at which to water.

Directions for Sasardi bay.—In approaching Sasardi bay or harbor from the eastward, the mark already given for clearing the outer banks should not be crossed until the Sasardi village is brought just in sight to the southward of Sasardi point, W. ½ S. This latter mark will lead to the southward of the outer bank; and when the west end of Sasardi island bears SSW., the course may be altered for either of the

channels most convenient. If intending to enter the harbor between the cays and the main, and the eastern channel is taken, the reefs which skirt the Sasardi islands should be rounded within 200 yards; if the western channel, the opening should be steered for about one-third the distance across from Sasardi point.

After passing the shoal in the middle, composed of hard limestone, Sasardi island will be found steep-to, and anchorage may be taken up anywhere within 200 yards of it, in from 5 to 7 fathoms. The shoals all lie on the western side of the harbor, and are easily avoided, by the eye. To sail out, is not so easy, except with a land wind, for the channels are narrow and the sea rough with the usual sea breeze.

Tides.—It is high water, full and change, at Caledonia harbor, at 11h. 40m.; springs rise 1½ feet, and neaps 6 inches. The tidal streams are overcome by a current which sets through the Sasardi channel to the southeast, about ⅓ of a mile per hour.

Winds and seasons.—In Caledonia harbor, as elsewhere on this coast, there are two seasons, the wet and the dry; the latter continues from January to April or May, when the wind blows strong and often violent during the day, from NNW. to NNE., accompanied by a very heavy sea, and lulls on the shore to nearly a calm, during the night At this season the temperature is about 82°; the atmosphere is exceedingly moist, and so hazy that, at times, the land cannot be seen more than 5 miles; yet the climate is generally healthy.

In the rainy season, which occupies the remaining portion of the year, the breeze lulls and becomes variable, and a land wind blows off, with occasional squalls from the SW.

Pinos isle, the southeastern extremity of which lies NW. by N., about 2 miles, from Sasardi point, is about a mile in length, southeast and northwest, and a little less in breadth; it is separated from the main by a channel 400 yards wide in its narrowest part, with 2 to 3 fathoms water on sand and grass. The island is high, but a little lower than Oro, and a hill extends through it, on which are two remarkable wooded peaks; its northeast and south sides are scarped, and bordered by reefs, which, however, lie near the shore.

Water.—On the south side of Pinos isle there is a small stream of good water, which runs down a gully, and into a small basin at the bottom of the declivity, but so near the shore that an unusual rise of the tide washes away the sand, and the sea flows into it.

Excellent fire-wood may be cut to the eastward of the watering-place, but great care must be taken to avoid touching the manchineal tree, which abounds here, and is poisonous.

Anchorage.—There is anchorage both off the east and west ends of Pinos isle, but exposed, the former from E. to NE., the latter from N. to NW.; and a constant ground swell rolls in, particularly at the

eastern anchorage, which makes riding very uneasy. At the east end a berth will be found in 9 fathoms, with the south end of the island about NNW., but vessels of light draught may go so far in as to bring it to bear NNE.; the point is so bold that a small vessel might heave down alongside it.

The western anchorage is by far the better, being partly sheltered from the sea breeze; these anchorages, however, should only be used in a case of necessity.

River Navagandi or Mona.—At 3 or 4 miles, W. by N., from Pines isle, is the entrance to a little river, called, by the natives, Mona. The water in it is excellent; but the narrow cuts leading in through the reefs are intricate, and the breakers so heavy that it is extremely difficult and dangerous for a boat to get through them. Abreast the west end of Pinos isle is the entrance of the Navagandi lagoon, which is blocked up by the reefs which skirt the shore all along.

On a sandy spit, on the east side, there are a few huts, and 6 or 7 miles up the river there is a settlement, where vegetables and poultry may be obtained.

Mulatas archipelago.—At 2 miles, about NNW., from Pinos isle, is Pájaros island, which is low, covered with brushwood, and surrounded by reefs having 7 and 8 fathoms, rocky botton, close-to. At this island commences the extensive archipelago of the Mulatas, composed of cays, shoals, and reefs, which, sweeping round to the northwestward, at a considerable distance from the mainland, terminate off San Blas point, about 80 miles distant.

The cays are mostly low, flat, sandy, and thickly wooded, and lying in clusters, having navigable channels between leading into secure anchorages within them all along the shore. Some of the cays have springs of good water, and convenient spots for landing and careening, and the fishing and turtling around them is excellent.

The main shore contains several sandy bays, with many small streams running into them, but, from the fringe reef, are extremely difficult of access.

The interior of the main is high and mountainous, and there are many remarkable peaks, which serve as guides to the anchorages and channels, to those with local knowledge.

The principal channels are those of Pinos, Mosquitos, Cuiti, Zambogandi, Punta Brava, Cocos, Rio de Monos, Ratones, Playon Grande, Puyadas Arévalo, Mangles, Moron, Caobos, Holandés, Chichimé, and San Blas; which are all more or less easily navigated. Great care and attention to the lead is required in navigating this coast, for it is supposed many banks lie outside the cays, similar to those in the neighborhood of the Sasardi islands, which in heavy weather are dangerous.

Holandés cays.—This group is about 7 miles in extent, from east to west; its eastern extremity lies E. ½ N., 18 miles, from San Blas

point. The north side of the reef which bounds the cays is 8 to 10 miles from the coast, and the cays are separated from those immediately adjacent to the mainland, by a clear opening 3 miles wide.

Gulf of San Blas.—San Blas point, which forms the northeast point of the gulf of that name, is low, and skirted by a reef to the distance of of $1\frac{3}{4}$ miles, on which are several cays; the easternmost is named Cay Francés. From San Blas point to Mandinga point, south of it, the gulf is 6 miles wide, and to the westward of that line it is about the same distance deep; the coast is low all round, and bounded by mangroves. In a southwest and westerly direction from Cay Francés, there are twelve more islets, upon some of which are smll fishing establishments; and to the eastward of them are many banks and islands, forming part of the Mulatas archipelago, with various channels between.

Chichimé channel, the northwesternmost leading into the gulf, is 3 miles wide, and is bounded on the west side by the cays which lie off San Blas point, on the east by the reefs which bound the Chichimé cays, and on the south by those surrounding the Lemon cays.

San Blas channel is bounded by the San Blas cays to the northwest, and the Lemon cays to the southeast, and is $1\frac{3}{4}$ miles wide.

Holandés channel, the largest of all in this direction, is $2\frac{3}{4}$ miles in width, with a depth of 14 fathoms on sandy bottom. Its entrance is formed on the east by the western extremity of the reefs extending from the Holandés cays, which break heavily, and on the southwest by Icacos cay, which is dry, and covered with high icacos trees.

At a little more than $1\frac{1}{2}$ miles, WNW., from Holandés cays, there is a rocky bank of 6 fathoms, $\frac{1}{2}$ mile long, north and south, which breaks when there is but little swell, and should be left to the westward in entering.

Directions for gulf of San Blas.—To enter the gulf of San Blas by the Chichimé channel, which is the best, having opened out the mouth of the channel, and being on the meridian of the second islet (from the westward) of the Lemon cays, steer S. towards it, until about abreast Cay Francés, the easternmost of the San Blas cays; thence the course will be about SW., through the middle of the San Blas channel, between the reefs which extend from Cay Francés and those from Gallo cay, the westernmost of the Lemon cays. Being within the latter, a vessel may proceed as most convenient to an anchorage on the north side of the gulf, or to Inglesa bay, in the southwest part of it; or to that in Mandinga bay, which is well sheltered.

To proceed to Mandinga bay, the cays which lie to the northward of Mandinga point will serve for a guide. Cabras, the outermost, lies a mile from the point; and N. by W., nearly the same distance, from that islet, there is a little sandy cay, which must be given a good berth. At a little more than $1\frac{1}{2}$ miles, WNW. $\frac{1}{4}$ W., from Cabras islet, there is also

a bank with 1 and 1½ fathoms on it, and the passage to the anchorage lies between this bank and the little sandy cay just pointed out.

Should the Holandés channel be taken, the eastern side is well marked by the edges of the reefs extending from the westernmost of the Holandés cays, and, as already said, a vessel should pass between them and the 6-fathom bank, on which the sea generally breaks, situated WNW., 1½ miles, from them. Then steer for the east end of the Icacos reef, giving it a good berth in passing, and having brought Icacos cay to bear N., the course is about WSW. to the anchorages at the head of the gulf. The channel is clear of danger, with depths from 21 to 25 fathoms, oozy bottom, and from 2½ to 3 miles wide, between groups of rocks, detached cays, and reefs.

Piedras and Perro cays.—Off the northern part of San Blas point, which is low and covered with mangroves, lie the Piedras and Perro cays, united to the Cay Francés reefs, which terminate at an island, in front of a lagoon, 1¼ miles farther to the westward.

Escribanos harbor.—From Perro cay, the coast continues W. ½ S., for nearly 10 miles, to Cocos point, on the east side of the mouth of Escribanos harbor; the intermediate shore is low, and forms something of a bay, skirted by a reef. The most prominent objects on it are Mogote point, which is small, a little salient, and has a hillock on it; Cerro Colorado, round, scarped, and projecting but little; and Playa Colorado also round, and skirted by reefs extending off 200 yards.

Cocos point projects into the sea, and from it Escribanos point bears W. by S., 1¾ miles. In the middle of a bay formed between these points is Escribanos harbor, extending to the southward ½ mile, and having only from 6 to 9 feet water in it; outside, off both points, there are very shallow reefs; and in the channel, formed by them, there are from 3¼ to 6 fathoms.

Escribanos shoals.—About 2 miles northeastward of Escribanos point, there are two rocky shoals lying close together, with very little water over them. The one nearest the coast extends ENE. and WSW., about a mile, and has a small islet on it; the other lies about WNW. from the above islet, and is nearly a mile in extent, from east to west; both are steep-to, with 3 and 4 fathoms on them.

Escribanos bank.—At 5½ miles, NW. by W., from the Escribanos shoals, is the bank of the same name, which extends nearly 2 miles in that direction, and has from 5 to 8 fathoms water over rocky bottom. To the northward of its edge, 400 yards, are 16 to 31 fathoms; and its northwest end bears NW. by N., 8 miles, from Escribanos point. Heavy seas generally break upon it; but otherwise a good lookout must be kept from aloft for the discolored water.

The channel between this bank and the Escribanos shoal carries from 8 to 17 fathoms water, on sand, gravel, and rocks.

Coral shoal.—In 1879 the captain of the mail-steamer *Saint Laurent* reported that his vessel touched twice, 10 miles from the coast, between points San Blas and Manzanillo. Cape Manzanillo bore W. by S., and the vessel had passed 3 miles to the northward of Escribanos bank.

The captain thought the vessel struck upon a bank of coral. When she struck the second time the following bearings were taken: Quengo island S. ½ E. and Tambor island WSW. ¼ W. No soundings were taken.

Islands.—At 3½ miles to westward of Escribanos harbor, and about ½ mile from shore, is the small island of Culebra; and 6 miles farther westward is Quengo island.

Mountains.—The mountains which continue along this coast as far as Porto Bello are sufficiently remarkable and useful objects; the Cerro de la Gran Loma or Gordo, rising SW. ½ S., 7 miles, from Culebra islet, being rather more prominent than others in this neighborhood, serves as a mark for keeping clear of the Escribanos bank and shoals. The summit of this hill is of some extent, and appears a little higher than the Cordillera in which it is situated.

Pescador or Terrin point is fringed with reefs which extend northward 200 yards and westward ½ mile; and, continuing on in a southerly direction, surround three islets lying between the point and the northeast point of Nombre de Dios harbor, about 1½ miles to the southwestward. At 400 yards, NW., from Pescador point, is Pescador islet; and NW. by W. ½ W., $\frac{9}{10}$ of a mile, from the same point, is the Buey shoal, between which and the reefs skirting Pescador point, there are 9 and 12 fathoms.

San Cristóval bay.—At 5 miles, W. by N., from Pescador point, is Manzanillo point, a mile to the eastward of which is the islet of Martin Pescador; both are high and scarped. Between these points the shore recedes to the southward, forming a bight about 3 miles deep. At 3¾ miles, W. ¼ S., from Pescador point, the shore projects considerably at Cristóval point, and to the southwest of this, at the bottom of the bight, is a small foul bay of the same name. About 400 yards, NE. ½ E., from Cristóval point, is an islet named Juan del Pozo, surrounded by rocks; and about SE., ½ mile, from the islet, is the Vibora bank. Between this bank and Juan del Pozo, and between the latter and the point, there are 9, 10, and 13 fathoms water on gravel and coarse sand; and between the Vibora and Buey shoals, off Pescador point, there are about the same depths on sand and clay.

From the head of San Cristóval bay, reefs extend nearly a mile towards Cristóval point; this part is dangerous in strong winds. The coast between Cristóval and Manzanillo points is lofty and scarped.

At the east side of San Cristóval bay, about 1½ miles southwestward of Pescador point, is the small cove or harbor of Nombre de Dios. Its mouth has 3¼, 4, and 5 fathoms, but the entrance points are skirted by reefs, and so is the greater part of the interior.

Caution.—From the numerous shoals which have been pointed out, it will be quite evident to the mariner that to navigate within this bight requires the greatest care and attention, and the leeward part of it should be avoided altogether.

Mountains.—Among the mountains in this neighborhood two are remarkable, named Saxino and Nombre de Dios; the first is high, and terminates in two peaks near each other, the northeasternmost of which bears about S. by E. ½ E., 7 miles, from Pescador point; the latter mountain rises to a single peak, about S. by W., 8 miles, from the same point, and is a guide for Nombre de Dios harbor, which is on its meridian.

Manzanillo point, the northern extremity of the coast of Panama, is a high scarped projection, with two hummocks on it resembling a saddle. Near this point are several islets and a shoal; Martin Pescador, the outermost islet, is about 200 yards in extent, from north to south, and lies about a mile eastward of the point; about 800 yards, SSW. ½ W. from this islet, and about ¾ of a mile from the point, is Manzanillo island, which is the largest; off the north side of this island are three rocky islets, the farthest out being distant over 200 yards; SSW. ½ W. from the same island, there are three more small islets, surrounded by reefs, extending northeast and southwest; and also to the eastward, about 300 yards, there is another small one. All these islets are high and scarped; between those of Manzanillo and Martin Pescador there are from 10 to 14 fathoms water.

Manzanillo shoal, lying NW. ¼ W., distant 800 yards, from Manzanillo point, has very little water over it, and 5 and 6 fathoms close-to; between it and the point, the depth is 13 fathoms.

With Manzanillo point bearing SW. ½ W., and Tambor island W., about 4 miles distant, H. M. S. *Harpy*, in 1829, obtained 6 fathoms water over rocky bottom, deepening to 20 fathoms in a northwest direction.

Tambor island, bearing WNW., about 1½ miles, from Manzanillo point, is high, round, and scarped; and connected by a reef, 400 yards long, with the northernmost part of Venados or Bastimentos island.

Bastimentos island is nearly a mile in length, northeast and southwest, and forms, with the mainland, the northeast channel of Bastimentos harbor, which is about 300 yards wide between the reefs, with 5 and 5½ fathoms, sand. The island is foul on its southeast, south, and southwest sides; the latter, with Cabret island, which bears a little to the south of west, forms the northwest channel 600 yards wide in the narrowest part between the reefs, and carries from 3½ to 9 fathoms, mud.

Bastimentos harbor, although with depths of 3½ to 7 fathoms, and sheltered, is of little importance. All its shores are bounded by reefs; and the customary anchorage is to SW., S., and SE. of the south or sandy point of Bastimentos island.

Garrote harbor.—At 2⅓ miles, SW. ½ W., from the highest part of Tambor island, is the entrance of Garrote harbor, which is formed on the south side by the main land, on the east by Great Garrote island, and on the west by Pelado and other islets which extend westward for about 1½ miles to the mouth of the Boquerones. The entrance, which is scarcely 600 yards wide, between the reefs westward of Great Garrote island and Pelado islet, runs in a southerly and southeastly direction, with depths from 12 to 18 fathoms, mud, decreasing to 6½ fathoms within.

Mountains.—Between Garrote and Bastimentos harbors is the hill of Garrote, tolerably high, its summit terminating in a peak, about ¾ of a mile from the coast. At 3½ miles, S. by E., from the little bay of Garrote, is the high mountain of Capira, almost always covered with clouds; it is situated nearly east from Porto Bello.

At a short distance to the southward of Capira is the Sierra or mountain ridge of Llorona, extending nearly east and west; the eastern part of its summit appears as if cut down vertically, forming a peak, named the Campana or the Bell; and from this peak the ridge descends gradually to the westward to near the peak of Guanche. The Llorona is the highest range on this part of the main, its summit reaching an elevation of 3,000 feet, and its appearance is such that it cannot be mistaken for any other. In clear weather it may be seen from a distance of 45 miles; but in the season of the fresh breezes it is generally covered with haze; in the season of the vendavales and variable winds, it is often visible between 8 and 9 in the morning, and 4 and 5 in the afternoon; but in the remainder of the day it is covered with clouds.

Lavadera shoal, situated northward, nearly ¾ of a mile, from the northern extremity of Pelado islet, and west, 1 mile from Cabret islet, at the mouth of Bastimentos harbor, is composed of rock with very little water on it, and steep-to; there are 7½ and 9 fathoms close to a rock on which the sea breaks. The channels between it and Cabret and Pelado islets carry from 14 to 17 fathoms on mud.

Boquerones point, situated about 3¾ miles, SW. by W. ½ W., from Tambor islet, is high, salient, and scarped; about a mile to the southward, Casique hill rises to a peak of moderate height. NE. by E. from the point there are five small islets, named the Boquerones, about 600 yards in extent, which are the westernmost of the reefs and cays that extend from Pelado.

Farallon Sucio is the name given to the westernmost of a cluster of five small rugged rocks, which occupy a space of about ¼ of a mile from east to west. It appears to be steep-to, but from the easternmost rock a foul ledge extends, 300 yards, to the southeast. The northernmost islet lies W., nearly 4 miles, from Tambor island, with 16 to 30 fathoms, clay and sand, between, and 16, 21, 22, and 25 fathoms, between the north islet, the islets off the coast, and the Lavadera shoal. These

rocks appear from a distance as one islet, which is remarkable for its barren whiteness. This contrast with the Duarte islets, which are dark, or the main land, makes them a good mark.

Duarte islets, situated 3 miles, WSW., from Boquerones point, are four in number, extending NNW. and SSE., $\frac{3}{4}$ of a mile. From the northernmost islet, a reef extends in a northwesterly direction, about 200 yards. The southernmost islet is separated from Duarte point on the main, by a channel a little more than 400 yards wide; and from Sabanilla point, which bears E. by N. from the islet, by a channel a little more than $\frac{1}{3}$ of a mile across; between these two channels there are from $2\frac{3}{4}$ fathoms water close to the islet, to 15 fathoms towards the main.

Sabanilla point is fringed by a reef and some rocks; the adjacent coast is high and scarped, with some bays; and José Pobre point, NE. $\frac{3}{4}$ E., $1\frac{1}{2}$ miles, from Sabanilla point, projects a short distance.

Porto Bello point, the northwest point of the entrance of Porto Bello, bears S. by W. $\frac{3}{4}$ W., 2 miles, from the northernmost part of the Duarte islets. The intermediate coast is high and scarped, and in it is a small harbor called Leon, of not much importance, the entrance being almost blocked up by reefs and a small island at the mouth.

Rock.—Midway between the Duarte islands and Porto Bello point, and 700 yards off shore, there is a rock which always breaks. José Pobre point is just open off Sabanilla point, NE. by E., when near it.

CHAPTER VII.

COAST OF PANAMA, VERAGUA, AND CHIRIQUI—PORTO BELLO TO THE RIVER CHANGUENE.

Current.—On arriving within about 30 miles of the southern shore of the great bight, known as the gulf of Columbus, the pent up water is forced to the eastward. This great eddy will generally be found running between Salt creek and Porto Bello, at the rate of 2 to 3 knots an hour. It is also to be observed, that the northeasterly current runs strong close to the entrance of Porto Bello; and in the rainy season from 1½ to even 3 knots an hour as far as Farallon Sucio. Between the entrance of Chiriqui lagoon and Chagres there is often, however, a narrow stream setting to the westward, which extends about 3 miles from the shore.

Porto Bello is one of the best harbors west of Cartagena. The port being, however, inclosed to the north and south by hills ranging from 600 to 1,300 feet high, shutting out the regular breezes, and bounded on the east by dense swamps, the position is exceedingly unhealthy, and the port is now of little commercial importance. The forts and government buildings have fallen into decay. The population in 1882 numbered about 500.

The north side of the port is formed by a narrow, irregular island, nearly 1½ miles in length, from east to west, of moderate elevation, and steep-to. The south shore is bounded by the base of the mountains which rise, not far inland, to a height of 1,300 feet, and are seldom unclouded. This side is foul, being skirted by a coral reef to the distance of 200 to 400 yards, with irregular soundings some distance outside; the depth of water in the harbor is reported to be decreasing considerably.

The village of Porto Bello, and the ruins of the castle of St. Jerónimo are situated on the beach, in the southeast corner of Porto Bello; there is a sand-bank of 6 feet water extending in a northerly and westerly direction from the castle. On the north shore, opposite the town, are the ruins of San Fernando castle, hidden by bushes.

Off Cocal point, the southwest point of the port, are three small islets, the outermost and largest, named San Buenaventura, lying 600 yards southwestward of the point. Foul ground extends about 600 yards to the westward and northward of these islets; and at this distance, with the northwest point of the outer islet bearing S., and Cocal

point SE. ½ E., is the Farnesio shoal, of 4 fathoms, within which there is no safe passage.

At the head of the port, a sand-bank stretches off about 500 yards from the mangroves, leaving a channel on the north side into the careening cove, which has depths of 3 or 4 fathoms.

Between Porto Bello point and San Buenaventura islet, the width of the entrance is 1¼ miles; but a short distance within this, between Iron Castle point and the south shore, it is about ½ mile wide; this breadth is carried up for about a mile, to the head of the harbor, and the depth gradually decreases from 17 to 7 fathoms, close up to the edge of the sand-bank.

Green islet.—At 300 yards, SW., from Porto Bello point, is Green islet, little more than 100 yards in extent, from east to west, and having a break in the middle which appears at a certain distance to divide it into two parts; it is clear all around, but the passage between it and the point is not safe for large vessels.

Salmedina bank.—At ¼ of a mile, W., from Green islet is the Salmedina bank, on which the sea breaks in two distinct patches; it is composed of rock, about 100 yards in extent, dry at low water, with 6 fathoms close around; in the channel between it and the islet there are 16 to 21 fathoms, clay.

Directions for Porto Bello.—The wind generally blows out of Porto Bello, or is light and baffling, according to the seasons; a vessel will therefore most probably have to work or tow in. In approaching from the northward, it is advisable to leave the Duarte islands about ½ mile to the eastward, and steer to pass about 200 yards, or with a steady breeze even less, from Green islet, to avoid the Salmedina.

Having passed the islet, the vessel may keep close to the wind, with the north shore on board, and in the season of the breezes she will fetch into the middle of the harbor. After passing Iron Castle point, in working up, when standing to the southward, no part of the town must be shut in with the land to the westward, to avoid the ledge off the south shore. An anchorage may be taken up as most convenient, for, with the exception of the above ledge, there is no danger whatever in the way.

When approaching from the westward, it is recommended to keep the shore about 3 miles distant; and in the night, the soundings should not be neglected, as between Chagres and this port they extend from 8 to 10 miles. From this direction, the entrance is made known by two remarkable trees on the top of the hill on the south side, and a signal post upon a hill on the north side of the harbor; the continued existence of either, however, is very doubtful, but, from this quarter, the opening itself is sufficiently remarkable. In standing towards the San Buenaventura islands, Green island must not be opened to the westward of Porto Bello point, or brought to bear to the northward of NNE.

½ E., and in standing towards the Farnesio shoal from the northward, the northernmost extremity of the lines of fort St. Jeronimo must be kept well open of the land.

From May to November, light breezes from the southwest and west, with heavy rain, prevail in the harbor, but towards morning, there is a light air from the northeast; therefore, in leaving, vessels should be prepared to get under way at day-break, with boats ahead to tow.

The Coast.—About ½ mile to the southward of Cocal point, is Buenaventura cove, so obstructed by reefs as to be of little use. From this cove the shore trends about SW., 4½ miles, to Gorda point, near which may be said to terminate the high land of Llorona, already described. At 3¾ miles, E. by N., from the point, is Guanche hill; and between Buenaventura cove and the point, the river Guanche empties.

From Gorda point to the entrance of the river Grande, the coast trends SW. by W., 5 miles, and the land gradually diminishes in height; westward of the river it is very low and bounded by mangroves. Near the entrance of the river Grande are some small cays, named Naranjos, covered with trees and surrounded by reefs, to the westward of which there is anchorage in 4½ to 7 fathoms, sand. At 4¾ miles, SW. by W. ¾ W., from the Naranjos cays is point Longarremos, also formed of low mangroves, and bordered with reefs to the distance of somewhat more than 200 yards, having 11 fathoms, clay, close-to.

Between the above cays and point, the mangrove shore is very irregular, and forms two bights or creeks, named Minas; the eastern extends inwards to the SSE., about 3 miles, but varies in breadth; the western runs in to the southward about a mile, and is much narrower than the other, and the shores of both are fringed with coral.

Manzanillo harbor.—The point of Longarremos extends to the WSW., about 1½ miles, when the coast line takes a southerly direction, for about 3 miles, to abreast Manzanillo island, at the entrance of Limon or Navy bay. Between this island and the main, a small harbor is formed, which has a depth of from 4 to 2 fathoms. At the entrance, which is ¾ of a mile wide, there is anchorage in 5 fathoms, sand and clay, about ¼ of a mile from the eastern shore, with the west end of Margarita cay just open to the westward of Coco Solo point, bearing N. ½ W.

Manzanillo island, which is about a mile long, north and south, and ¾ of a mile broad, is very low, and for the most part covered by mangrove bushes; it is separated from the main by the Boca chica, a narrow boat channel leading into the harbor.

Aspinwall or Colon.—The town of Aspinwall is situated on the west side of Manzanillo island, and is connected with Panama by a railroad across the Isthmus.

There is a floating population of from 6,000 to 8,000, composed principally of employés of the Panama Railroad and Canal Company. A ship canal is in course of construction across the Isthmus at this point. There

is regular steam communication with various ports in the United States and Europe, as well as with Central and South American ports. Vessels of the Pacific Mail Co. ply between Aspinwall and New York, three times a month each way. There is telegraphic communication with the United States, via Jamaica, and also via Panama and Vera Cruz. The exports are bananas, rubber, and hard woods, other articles shipped from this port being mainly in transit from the west coast.

Light.—On the northwestern extremity of Manzanillo island, and SW. ½ S., nearly 3 miles, from point Longarremos, a *fixed white* light is placed, on the top of an open frame-work, at an elevation of 60 feet above high water, and should be visible, in favorable weather, at a distance of about 10 miles; it is often difficult to distinguish this light from the ordinary white light carried by steamers.

Buoys.—A coral reef skirts this end of the island, and abreast the light-frame it extends out 200 yards. A can buoy painted *red*, and having on it a broken vane, is moored in 5¼ fathoms water, about 500 yards, WNW., from the light-frame; its position,* however, cannot be depended upon. Vessels should not pass between this buoy and the reef. Several buoys are also placed off the wharves for the convenience of warping or mooring.

Limon or Navy bay.—At 2¼ miles, W. by N., from the Colon lighthouse, is Toro point, and between them is the entrance of Limon bay; this bay is 3½ miles deep, from north to south, and about 3 miles wide at the head. The depths at the entrance are 5½ and 6½ fathoms, whence they decrease to 4½ fathoms, in the middle, and 3 fathoms, at a mile from the head of the bay; and, within this distance, they shoal gradually to the beach to the southward. It would appear that the depth in this bay is continually decreasing. Capt. J. N. Miller, U. S. N., reported in 1884, that the depths on the eastern side of the bay were from ¼ to ½ fathom less than shown on the chart.

Toro point, the western side of Limon bay, is formed by a wooded peninsula, about 2½ miles broad and 400 feet high, consequently totally different in appearance from the low mangrove coast to the eastward, and this serves to point out the locality from a wide offing. From Toro point, a shallow coral ledge, projects N. by E. ½ E., ¾ of a mile, and is generally marked by heavy breakers; it should not be approached within the depth of 10 fathoms, about 1½ miles to the northward. The ledge also extends ENE. ½ E., about ½ mile, from the point, and this is the only danger on the west side of the bay.

Limon point, on the west side of the inner part of the bay, stretches a little to the eastward, and affords shelter under its south side for small vessels, in 2½ or 3 fathoms water.

In the season of the north winds, the bay being completely exposed

*January 1884, Capt. J. N. Miller. U. S. N., reported this buoy as lying in 4½ fathoms of water, within 200 yards of the light-frame, and bearing from it about WNW. ½ W.

in this direction, a heavy swell rolls in. These winds, however, occur only in November, December, and January, then but rarely, and they are seldom violent.

Indications of a Norther.—The approach of a Norther, on this part of the coast, is indicated by a long heavy swell from the northward, for two or three hours before the storm bursts. The sky has a sombre, threatening appearance, the atmosphere is murky and chilly, and there are often fitful showers of rain in large drops. The clouds move from the northward for at least a day before the storm begins, and gradually increase in heaviness and extent. During the prevalence of these storms, the wind continues from the northward or northwestward, although the directions of the surface winds which precede them seem to give no indication of their approach. In the majority of cases, the wind blows from NE. or ENE., with uniform force, for several days before the storms; but one of the most violent of these gales which have occurred for many years, was preceded by moderate southeasterly breezes, which continued until about eight hours before the storm began. The duration of these storms is from one to three days.

The practice instituted by the mail steamers, of casting off lines and standing to sea, on the approach of a Norther, is shown to be the best method to escape injury. It is true that the ground is good for holding, but only the stoutest kind of a vessel, with perfect ground tackle, could withstand the heavy sea, while at anchor, and the danger to which vessels of deep draught would be particularly liable, results from their excessive rise and fall, owing to the roughness of the sea.

Anchorage.—The best anchorage, in ordinary weather, is abreast the Pacific Mail Company's dock, about 600 yards off; but in bad weather, it is better to anchor on the opposite side, to avoid the heavy sea that rolls in around Toro point; the holding ground is excellent.

Supplies.—Fresh meats, vegetables, and fruit are scarce, and of poor quality. Preserved provisions can be had in limited quantities.

Water can be obtained from the Panama Railroad Company, at 1½ cents per gallon, delivered in tanks on the wharf; it is taken from the river, and must be thoroughly filtered before being used.

Coal.—American and English coal can be had from the Railroad Company, alongside the wharf, at from $15 to $20 per ton. Coal may also sometimes be obtained from a vessel in the harbor, at a much less cost.

Tides.—There is a rise of tide of about 14 inches in Limon bay, but the time is uncertain.

Chagres bay.—From Toro point, the coast trends WSW., 2 miles, to Brujas point; the shore in this space forms a low shelf of rock, intersected near the middle by a small sandy bay, and is skirted at a short distance by a ledge nearly dry at low water.

Brujas point is a bold, rocky, wooded headland, from whence rises the highest part of the peninsula mentioned above. At the foot of the cliff, and only a few yards distant, is a small isolated rock, with perpendicular sides, crowned with bushes, called the Mogote de Brujas, which, when seen open of the bluff, is remarkable. The rock is connected to the bluff by a flat ledge, dry at low water, extending outside it about 200 yards; it is steep-to; there are 6 fathoms 400 yards from the rock.

From Brujas point to the peñon or bluff at the entrance of the Chagres river, the shore extends nearly straight, SSW., 3 miles, and is rocky and steep-to. About midway, however, there is a small rocky cove, into which a rivulet falls over the cliff from a height of about 30 feet; the water is excellent, but the heavy surf prevents landing anywhere near it.

On the north side of the peñon of Chagres, there is also a small sandy cove named Laja, about 200 yards wide, and having a depth of 15 feet close to the beach, into which a little stream flows at the southeast corner, by the side of the precipice. The north side of this cove is bounded by a bold, irregular, bluff headland, rising to the height of 120 feet; and being higher than the peñon, hides the castle of San Lorenzo from the northward, until the latter is brought to bear S. by E. ½ E.

Chagres river.—The peñon or flat rocky promontory which bounds the north side of the entrance to the river Chagres, is 400 yards in length, east and west, and about 175 yards broad. On the north, west, and south sides, it rises almost perpendicularly from the sea, to the height of 82 feet at the outer end, and to that of 100 feet at the inner part. The western part is occupied by the fortifications of San Lorenzo, immediately in the rear of which there is a level plateau, 300 feet in length, terminating at a little mound commanding the valleys on either side, and the only road to the castle. On the walls of the sea face are eight brass 32-pounders, and on the inner walls are two brass 13-inch mortars; but the works are everywhere in a state of decay, and the buildings almost in ruins.

The south side of the entrance to the river is formed by a dark sandy beach, and from Arenas point, the northern extremity, to the base of the promontory opposite, the width is 225 yards. From the inner end of the promontory, the shore turns suddenly to the southward, and abreast Arenas point the river is only 100 yards wide.

The bar across from Arenas point to the north shore is about 100 yards broad, and has 11 feet water in the dry season, but the depth changes according to the state of the river. The mouth of the river, outside the bar, is obstructed by the Laja reef, a rocky ledge about 50 yards in diameter, which breaks in heavy weather, and is nearly even with the surface of the sea. The inner edge lies 200 yards to the westward of the peñon, and between them there are 15 feet water close up to a little dry dock at the foot of the cliff. There is also the same depth, for 100 yards, between the Laja and the ledge skirting the bluff on the north side of Laja cove. To the southward of the Laja there is a small

channel of the same depth, but too narrow to navigate with safety, except in a case of necessity when leaving the river. The south side of the entrance is bounded by a dangerous rocky ledge, which extends west, ½ mile, from Arenas point, to a patch of rocks nearly dry, breaking heavily in fresh northeast breezes.

The town of Chagres is situated on the eastern shore, between the base of the peñon and the Caño rivulet, which enters the river abreast Arenas point; the shore in front is skirted by a flat, rocky ledge, so that small craft find it more convenient to lie alongside the bank, just above the Caño.

Anchorage.—The anchorage off Chagres is an open roadstead, exposed from NE., round northerly, to SW.; in the latter direction, however, it is somewhat protected by the distant land, and bank of soundings; but in strong winds from between W. and NE., remaining here is attended with risk; and it will be better, when the weather threatens from these quarters, to put to sea, or proceed to either Limon bay or Porto Bello. It is stated by some experienced navigators, that the river stream runs out to the NW., with sufficient strength to ease the strain on the cables, and enable a vessel to ride out these gales, but nothing is more uncertain than the force and direction of this outset. Should the easterly current be strong, it will sometimes overpower the river stream only a mile from the mouth, and turn it towards Brujas point; the line of junction is generally well marked by the discolored water. A good berth will be found with the bluff of the peñon, or castle of San Lorenzo, bearing SE. by E., and the rock of Mogote de Brujas just open of the bluff, NE., in 10 fathoms, mud, about 1½ miles from the shore; but a position farther in may be taken, if necessary.

Directions.—Approaching Chagres or Limon bay from the northeast, in the season of the breezes, from November to May, the first land seen will be most probably the lofty flat mountain ridge of Llorona, overlooking the harbor of Porto Bello from the southward, at the height of 3,000 feet. As before stated, the shore is very low to the westward of Porto Bello, until it reaches the little flat peninsula of Chagres, and it is of the same character to the westward of that river, for a distance of about 25 miles; therefore the locality is well marked by the peninsula, and easily made out. The interior is so generally shrouded by the rains and deadly vapors arising from the swamps, that the inland chain of the Calderos Altos is seldom visible. The sierra of Llorona is also frequently obscured, but the irregular hills which inclose Porto Bello are generally unclouded, and, being from 600 to 1,300 feet high, are sufficiently remarkable to be distinguished from the much lower table land of the Chagres peninsula.

In the other part of the year, when calms and variable winds prevail, and the easterly current is most powerful, it will be better to keep an offing from 30 to 40 miles, and to make the coast even to the west-

ward of Chagres. By doing this, a vessel will not only avoid the strength of the current, but, in a great measure, escape the heavy rains and violent squalls from the shore.

In this case, the locality of the river is pointed out by a remarkable piece of flat wooded table land, about 3 miles in diameter, which lies not far inland, on the west bank of the river; its north side rises rather abruptly to a height of 800 feet, and the elevation of its summit does not alter more than about 30 feet in its whole extent; there is nothing like it in the neighborhood. The land behind Chagres being higher than the peñon, the castle is not seen from the westward, until within a short distance.

In leaving Chagres or Limon bay, and bound to windward, it will be of course advantageous to work or run along shore in the influence of the great eddy stream, which generally reaches as far up as Cartagena. In the season of the variables and hazy weather, however, great care is requisite, particularly at night; for the stream runs close to the islets off Porto Bello, and both hand and deep-sea leads should be well attended. It is also necessary to warn the navigator to be well prepared to meet the violent gusts from the high lands at this period, and to anchor should it fall calm.

Pilon de Miguel de la Borda.—This remarkable isolated mountain, 1,669 feet high, is situated SW. ½ S., 32 miles, from Chagres, and about 13 miles inland of the sierra of Miguel de la Borda; it is not, however, often visible, being generally concealed by the dense vapors which hang over the extensive low, flat, surrounding plain; still, it may be occasionally seen from the Chagres anchorage.

The Coast.—From Arenas point, at the entrance of the Chagres river, a low dark sandy beach trends, with a slight curve, about SW. by W., for ¾ of a mile, to Boca de la Furnia point, which is low and rocky. The ledge bounding the south side of the channel into the river, terminates in 17 feet water, about 300 yards to the northward of this point. The shore continues rocky and foul, for about 400 yards, to a little rock called El Morillo, when it takes a westerly direction, for about ½ mile, and becomes sandy, as far as point Morrito. This point is formed by a low, red cliff, upon which are a few huts, and foul ground extends from it about 400 yards.

From Morrito point, a sandy shore trends to the southwestward, about 2½ miles, to Diego point. This latter point is formed by a low, rocky shore, and about a mile to the westward of its extremity is a remarkable white cliff, with a small sandy beach on either side, above the western end of which there is a cleared space and grazing farm. From Diego point, the land gradually ascends to the base of the Chagres table land before mentioned.

At about 4 miles, SW., from Diego point, there is a small village on the beach, named Lagarto.

From Lagarto village, the low, sandy shore, thickly wooded behind, trends WSW., 4 miles, to the entrance of the river Indios, where it is formed of low, red cliffs. In a small, sandy cove, about ½ mile to the eastward of the river, is the village of Salud, and about the same distance to the westward of the river, there is a remarkable cavern in the cliff.

From the river Indios, the shore continues its WSW. direction, for 14 miles, to the river Mangalee. From the end of the Indios cliffs, a sandy beach extends for about 3 miles, to a low, rocky shelf, upon which will be seen a few huts, thence for about 2 miles, when it meets with a remarkable ridge of low, red, indurated mud cliffs, which extends for about 3 miles.

Half a mile to the westward of the above cliffs, on the beach, is the village of Gicacal, consisting of a few straggling huts, on the left bank of a small stream.

River Mangalee.—From the village of Gicacal, the sandy shore, backed by low rocks, extends for 2½ miles, to the entrance of Mangalee river, which is pointed out by two or three huts on the west side, and a little, low, rocky point on the east side.

The whole line of shore between these points is fringed with coral, to a distance of from 200 yards to ½ mile, upon which the sea breaks so furiously as to render landing extremely difficult and dangerous, except under most favorable circumstances.

All the streams just described, from the Indios to the Mangalee, are navigated by small canoes, conveying the sarsaparilla collected on their banks, to the small trading vessels which occasionally call for it.

The Mangalee defines the northwestern boundary between the provinces of Panama and Veragua.

Anchorage.—There is anchorage all along the coast just described, in 6 to 8 fathoms, sand and mud, about 2 miles from the shore.

Aspect.—Near the entrance of the Indios, the land is about 150 feet above the sea, and to the westward it gradually rises. Abreast the middle of the red cliffs, eastward of Gicacal, there is a conspicuous round hill, 356 feet above the sea. Immediately behind the entrance of the Mangalee, the base of Sierra de Miguel de la Borda attains, almost abruptly, the height of 592 feet, whence it continues to rise in irregular densely wooded ridges to the summit, which is 1,552 feet above the sea, and S. by E. ¼ E., 5 miles, from the entrance of the river. The Pilon de Miguel de la Borda, before described, lies on the meridian of Gicacal, and is not visible to the westward of it.

Coclet river and mountain.—From Mangalee, the coast trends WSW., 11 miles, to the entrance of Coclet, and is bounded by a sandy beach, intersected occasionally by small patches of low rocks. About 5 miles from the Mangalee, a slight bay is formed, for about 2 miles, into which the Plantain river flows; the entrance is marked by a single hut on either side, and the deep valley through which it runs.

The Coclet river is pointed out by two huts on the west point of entrance, and a house in the middle of a small cultivated spot on the east side. Behind it rises the Sierra of Coclet, which, at 4 miles to the southward of the river entrance, reaches an elevation of 1,432 feet. This large mass of irregular hills is connected with the Sierra de Miguel de la Borda, by a wooded ridge from 800 to 900 feet high. A little to the eastward of the Coclet, the base of the Sierra rests on the shore, and continues to bound it, until interrupted by the valley of the Plantain river.

From the Coclet, the shore trends WSW., 6½ miles, to a rocky point forming the east side of a sandy bay about 1¾ miles in extent, which is bounded on the west by Rincon point. Half a mile to the eastward of this bay there is a small rivulet.

Rincon is a bold, scarped, rocky headland, reaching the height of 550 feet, ¾ of a mile inland. At 3 miles south of it the elevation is 800 feet. Abreast this headland, the edge of soundings is only 2½ miles distant, and the shore is so bold that there are 24 fathoms ½ mile off.

The Coast.—From Rincon point, for a distance of 6 miles, a sandy beach intersected by low rocky shelves, trends in a southwesterly direction, to the entrance of the Palmillo river; and the land near the shore gradually declines in height. The entrance of this little stream is pointed out by two huts on the eastern side, but so hidden by the dense foliage as to be extremely difficult to find. About 4 miles farther on, in nearly the same direction, is the entrance to the Belen river, and the space between presents the same features. This opening is so small, that it is only recognized by the receding of the low hills which form its valley.

On the west side of Belen river, the shore is rocky for about ½ mile, when a straight sandy beach extends westerly for 1½ miles, to Palisado point. From Rincon point, the shore is bold and clear, but from Palisado point, breakers extend nearly ½ mile, and the edge of soundings is about 5 miles distant.

St. Christopher bay.—To the westward of Palisado point, the shore forms a sandy bay, 2½ miles wide and a mile deep; into which Old Veragua river empties.

This river has a single hut on the east point of its entrance; and on the rising ground on the west side, in the center of a cleared space, apparently of savanna grass, there is a conspicuous white house.

The Coast.—From the west extreme of St. Christopher bay, the coast trends about WSW., 4 miles, to the Gold river; it is sandy, and skirted by a ledge which breaks nearly ½ mile off. About midway the beach projects a little, and near this spot there is a solitary hut. About ½ mile to the eastward of the Gold river, the beach is broken by a small, low, rocky point; and at 1½ miles to the southwest of the river there is a very remarkable red cliff, 100 feet high, on the eastern side of which a small stream appears to enter the sea.

At 1½ miles beyond the red cliff is Zapatero point, low and sandy, and breakers extend from it about ½ mile. From this point, the shore trends SW., 1½ miles, when it forms a small, sandy bay, about ¾ of a mile wide, the west side of which terminates at a high rocky bluff. At the bottom of the bay is the entrance to the Cocooyah river, which may be known by a hut that stands on the right bank, a short distance inland.

Gold or Conception river.—There is said to be a gold mine near the source of this river, from which it is named. The entrance may be distinguished by a remarkable umbrella-shaped tree, standing on rising ground on the eastern bank, to the eastward of which, on a small cleared spot, there is a house, and below it, on the beach, are two cocoa-nut trees at the mouth of the river; the opening of the valley is also very conspicuous.

Cordillera of Veragua.—Between the rivers Belen and Cocooyah, the interior is comparatively low, forming a deep valley for some distance to the southeastward, and the land declines in height towards the coast, where it is elevated about 150 feet; but only 2 miles to the southward of the Cocooyah, the northeastern extremity of the base of the Great Cordillera of Veragua rises abruptly 1,044 feet. The highest ridge of this immense mass of mountains traverses the isthmus from east to west, for about 70 miles, at the distance of about 15 miles from the coast.

La Silla de Veragua, the eastern extremity of the ridge, rises from the low plain of Panama, south, about 20 miles, from the entrance of the Coclet river, and, when seen from the northwest, forms a remarkable double peak, or saddle, 3,326 feet high.

Castle Chocó, about 15 miles to the westward of the Saddle of Veragua, is a most remarkable mountain, rising almost perpendicularly on its northern face, from the plain to an elevation of 6,342 feet; the flattened summit has the exact appearance of a huge, square castle, with a small tower at one angle. It is, however, so constantly enveloped in clouds, as to be seldom visible, except at the break of day, just before sunset, or on a sudden cessation of heavy rains, when the atmosphere will almost instantly become most remarkably bright and clear; and these remarks are applicable to all the high lands on this coast.

When visible, the castle is, of course, an excellent guide for the mouths of the small streams to the westward of the Coclet. From the Belen it bears about S., from Old Veragua S. ¾ E., from the Cocooyah SE. ½ S., and from Escudo de Veragua island SE. by E., from which latter it is distant 50 miles; it is also to be seen, under favorable circumstances, from the castle of San Lorenzo at Chagres, from whence it bears SW. ½ W., distant 67 miles.

From the base of Castle Chocó, irregular masses of wooded hills begin to rise, and, taking a northwest direction, reach an elevation of 3,100

feet, only 5 miles south of the Cocooyah. Thence the base of the Cordillera almost bounds the shore, as far as its northwestern extremity, near the meridian of the Chiriqui river, 35 miles to the westward of Zapatero point.

Several more remarkable elevations present themselves in this space, which it will be better to describe as we proceed to the westward.

The Coast.—From the bluff which lies a short distance westward of the river Cocooyah, the coast curves slightly to the southwestward, for about 2 miles, to the entrance of Wasorah river, which is very small; the shore is a sandy beach, divided in the middle by a small, rocky point, near which there is a hut.

From Wasorah river, a sandy shore, intersected by two rocky shelves, trends westerly, for 1¾ miles, when it terminates at the base of a range of most remarkable cliffs, which rise boldly from the sea, to the height of between 100 and 200 feet, and extend 2½ miles in a westerly direction. These cliffs appear to be composed of red, indurated clay, impregnated with minute metallic grains, which have become so highly polished by the attrition of the water, unceasingly trickling over them from the high lands in the rear, that when the sun shines on them from a low altitude, a most dazzling appearance is produced; they sometimes look like the white sails of a vessel, and the easternmost has been likened to the stern of a large ship; they are certainly most striking objects, and valuable guides to the coasters.

Westward of these cliffs, the shore resumes its usual features of dark, sandy beaches, separated by small, rocky shelves, for 1½ miles, where it terminates at a high, bold, rocky headland, close under which lie two little, rocky islets, having foul ground ¼ of a mile outside.

The shore now becomes more elevated, and, about ¾ of a mile westward of the above bluff, is the Candelaria river; on each point of the entrance, there is a single cocoa-nut tree, and on the western point, there are also two or three huts; it is also further marked by a house, standing on a slight elevation just above the the mouth of the river.

Catalina hills.—The deep valley through which the rivers Candelaria and Calawawa run, is about 4 miles wide, and is also well marked; its western side is formed by the Catalina hills, a large mass of irregular, rounded heights, rising abruptly from the shore, to an elevation of 1,738 feet; and its eastern side, by a ridge, with a gradual rise to a height of 2,600 feet, SE., 5 miles, from the Calawawa.

Calawawa river.—The distance between the Candelaria and Calawawa, is only 1¾ miles; and between, there is a small ridge of red cliffs. The latter stream discharges through the beach, and the entrance is pointed out by two cocoa-nut trees on the western point, and by some red cliffs, topped with trees, about ¾ of a mile to the westward.

The Calawawa is navigable for canoes about 20 miles, and beyond this a foot-path or bridle road leads over the mountains, to San Jago, the

capital of the province. The journey may be performed in about 36 hours, and the mode of conveyance is on the shoulders of Indians, who accomplish it with great ease and rapidity, even in the midst of incessant torrents of rain, which prevail at almost all seasons.

The red cliff westward of the Calawawa, is skirted by a coral ledge, extending about ¼ of a mile; round its western end, there is a hut on the beach, and near it some cleared grazing ground. From thence the beach extends westerly, for 2½ miles, to Coaïta point.

A mile westward of the above-mentioned cliff, the sand projects out a little to a point, from which a ledge extends off ¼ of a mile, and shelters a landing place to the westward of it, near a hut on the beach.

Coaïta point, which lies under the northeast angle of the Catalina hills, is low and sandy, and the most southern point on this side of the isthmus of Panama.

It may be useful to repeat here, that from Chagres to this point, a distance of 83 miles, the shore runs nearly straight, without any sheltered anchorage whatever; and, indeed, without safe landing, except in native boats under favorable circumstances, at spots known to the coasters and fishermen, for a heavy surf breaks continually along the whole shore. Abreast Coaïta point, the edge of soundings is about 6 miles distant, and the depths will be found regularly decreasing to the shore, which is generally bold and clear.

The coast, from Coaïta point to the entrance of the Passiowla, trends westerly, 6 miles, and the usual sandy beach is here intersected by two low, rocky shelves. About midway, a coral ledge extends about ¼ of a mile, and is steep-to. In this space, four small streams descend from the Catalina hills, the easternmost of which is visited by sarsaparilla pickers, in small canoes. The Passiowla is also navigable for small canoes, for a short distance, after the heavy rains, but at other times the mouth is blocked by a dry sand bar.

From the Passiowla, a ridge of red cliffs extends to the westward, about 1¼ miles, skirted by a beach, and crowned by a clump of remarkable flat-topped trees, about 200 feet above the sea. Westward of the cliffs, the shore forms a sandy bay, about 2½ miles long, through the middle of which a small streams clears an opening for its exit in heavy rains.

Buppan bluff.—The west end of the above beach terminates at the base of a large, bold promontory, formed by two bluff headlands, close together, and a third, about 1½ miles westward of them, named Buppan bluff. All three rise precipitously from the beach, in round cones, to an elevation of from 700 to 800 feet, only ¼ of a mile inland.

From Buppan bluff, a small, dry ledge extends about 400 yards, under the lee of which, in moderate weather, there is a landing-place. On the east side of the headland, on a slight elevation, is a fishermen's hut, and a little below it, above the beach, a small space of cultivated ground.

King Buppans peak.—The south side of the easternmost hill descends with a slight gradual slope, about 2½ miles to the southeast, when it rises suddenly to the summit of a narrow, conical hill, 2,846 feet high; it then forms, between the summit and a much higher ridge behind, a deep hollow notch, which is a most remarkable feature, although backed by the loftiest part of the Cordillera, which reaches an elevation of 7,140 feet, at about 15 miles from the coast.

The name, King Buppans peak, has been given to this hill by the Mosquito Indians, who, it is said, penetrated thus far in one of their marauding excursions, accompanied by their king. From the island of Escudo de Veragua, it bears SSE. ¼ E., distant 22 miles, and, from this direction, is a most conspicuous object among the neighboring heights. The ridge also bounds the west side of the valley of the Passiowla, which, between it and the base of the Catalina hills, is from 3 to 4 miles wide, and sufficiently well marked to guide to this locality.

From this elbow, the main ridge of the mountains takes a westerly direction, for about 20 miles, when a small valley separates it from the Cordillera of Salamanca or Chiriqui.

Tiger head.—At about 11 miles, W. by S., from Buppan bluff, a large spur extends in a northwest direction, which gradually descends, with a long slope, into the plain; a little below the summit, 3,882 feet above the sea, there is a small projection called the Tiger head, but more like the ear of that animal, which is most remarkable when seen from the northwest and northeast quarters; and, being generally visible when the higher summits behind are clouded, it becomes a guide for Escudo de Veragua, which bears N. by E. ½ E., 20 miles from it.

The Coast.—From Buppan bluff, a low sandy shore extends almost straight NW. ¼ W., 19 miles, to the Caña river. About 3 miles westward of the bluff is the entrance of Pedro river, and about the same distance farther on is that of the Chiriqui. Both are very small, and can only be entered by canoes after heavy rains.

Caña river.—The Caña separates Veragua from Chiriqui. The entrance is SW. by W. ¼ W., 11 miles, from the northwest point of Escudo de Veragua, and readily distinguished by two huts, one on either side; that on the western point is more like a house, and, being generally whitewashed, is a conspicuous object 7 or 8 miles distant. About 5 miles from the mouth, in a southerly direction, and near the foot of the Tiger spur, there is a small village, inhabited by New Granadians and Indians, who are employed in grazing cattle of a superior quality, collecting sarsaparilla, and washing for gold dust, which is occasionally brought down in small quantities. Small canoes can navigate the stream thus far; but the northeast swell rolls in so heavily that the passage of the bar is only safe in very favorable weather.

El Escudo de Veragua is an island 2½ miles long, from east to west, and about ¾ of a mile broad; and its southwestern extremity lies ENE.,

10 miles, from Coco Plum point, the nearest part of the main land. It is low and woody, and the trees grow so very regular in height, that, when first sighted, it appears like a small island of table land, which, when approaching from the northward, will be seen to slope down gradually to the westward. The eastern part of the island is formed of soft, reddish-brown, perpendicular cliffs, from 40 to 50 feet high, in which are imbedded several species of marine shells.

From the destructive action of the waves, however, the cliffs have been cut into, and separated here and there, at very short distances, from the body of the island, forming small islets; some of them have been pierced through, and the arches, being crowned by dense foliage and trees from 70 to 80 feet high, have a most remarkable and picturesque appearance when seen from a short distance. The west end and south side of the island are very low and swampy, and bounded by a dark, sandy beach, similar to that found on the main land. The southwestern extremity is steep-to, and affords the only landing place, which, however, is at most times difficult of access, on account of the heavy surf. From the west end, a reef extends about 200 yards, and also skirts the north shore, at the distance of $\frac{1}{4}$ of a mile, and the east end, half a mile, outside the little clay islets; from the middle of the south side a ledge extends about $\frac{1}{2}$ mile.

During the rainy season, several small rivulets force themselves through the sand on the south side of the island, but the supply of good water is so scanty, that the few fishermen who visit it in the turtle season are obliged to dig wells.

Anchorage.—A vessel may anchor off the southwest end of Escudo de Veragua, but will ride extremely uneasy, and not at all times safe; for although the soundings show a sandy and gravel bottom, it is but a thin stratum over a flat shelf of coral, which does not afford good holding ground. Should it be necessary to take shelter here, the west end should be rounded in a depth of not less than 8 fathoms, and a berth taken wherever the sea appears the most smooth, in about 10 or 12 fathoms, taking care, however, to leave plenty of room for dragging or weighing with the land breeze, which sometimes comes off suddenly with considerable force.

Tides.—There is a rise of tide of from 1 to $1\frac{1}{2}$ feet at the island of Escudo de Veragua, but the time of high water is not known. In the day time, at the anchorage, a vessel will generally tend to a westerly set, which ceases at night.

Bank of soundings.—The regular bank which skirts the main, forms, to the eastward of Escudo de Veragua, a large tongue, extending from the island, in an east and northeast direction, about 8 miles, and to the northward, 5 miles, with a tolerably regular increase in the depth; but to the northwestward, the soundings are irregular, as about 3 miles distant they change rapidly from 30, to 10 and 14 fathoms. They are also

irregular to the southward, but there is no danger, and a vessel may work to the westward quickly, between the island and the main, by means of the eddy, which generally runs in that direction.

The Coast.—From Coco-plum point, which is about a mile to the NNW. of the entrance of the Caña, the coast trends about NW., 3 miles, to Old Bess point, and is fringed with a reef to a considerable distance. About midway, close to the shore, there is a small cluster of islets, named the Tooley cays, and abreast them the wooded land rises to the height of 460 feet.

Tobobo bight.—From Old Bess point, the shore trends to the westward and northwestward, forming a deep, irregular mangrove bight, terminating at a bold, prominent headland, named Tobobo bluff, 500 feet high, at 5 miles, NW. ½ N., from Old Bess point, and W. ½ N., 14 miles, from the northwest point of Escudo de Veragua. The inner part of this bight is very shallow, and skirted by a dangerous reef, which breaks heavily about a mile from the shore, and is steep-to. There are several small openings, however, forming boat channels into Tobobo creek, in the northwest corner.

There are two huts on the south side of Tobobo bluff, and a spring of good water, in a small sandy cove to the northward of them.

Plantain cay, situated about NE. by E., 1 mile, from Tobobo bluff, is a small but remarkable wooded islet, rising abruptly from the sea to the height of 230 feet, and between it and the bluff there is a similar cay, named Tobobo, but only 150 feet high; between these cays there is a narrow channel, adapted for coasting vessels. Plantain cay has some small rocks, steep-to, close off its north side.

Tobobo bank, 5½ miles east from Plantain cay, is a small coral bank with 7 to 10 fathoms water, which tops with heavy rollers, and is exceedingly alarming; and NE., 5½ miles, from the cay, there are 10 fathoms, on a narrow coral ledge, with 14 to 20 fathoms, which lies just within the edge of soundings, and has 30 fathoms inside it. Vessels should approach this neighborhood with great caution.

Valiente peninsula.—Tobobo bluff forms the southeastern extremity of the Valiente peninsula, having on its northern side a small cove, whence the shore trends NW., 5 miles, to Chiriqui point, with bold, irregular hills rising from it all along; the beach is of white sand, skirted by small islets and detached rocks and reefs, to the distance of 200 to 400 yards, upon which the surf breaks most furiously. It is remarkable that this is the first clear, white, sandy beach met with to the westward of Chagres. Elsewhere, as far to the westward as Greytown, the beaches are composed of dark, almost black, ferruginous sand, which is so impregnated with minute metallic particles, that a magnet thrust into it will frequently be brought out completely coated with them. The only exception is the above beach, and the sea or northern sides of

the outlying cays and islands, which are bounded by beaches of pure white calcareous sand.

It is also remarkable that the beach of the Mosquito shore, northward of Greytown, is in many parts similar, except that the sparkling appearance seen there is owing to small particles of mica, which, at first sight, have been mistaken for gold dust. Good coal has been found in this peninsula, near Secretary and Saddle hill, which extends through Popa island for 50 miles to the northwest.

Valiente peak.—From Chiriqui point, a rocky shore extends westerly, 2½ miles, to cape Valiente, the northwestern extremity of the Valiente peninsula; and bold, irregular, densely wooded hills rise abruptly from the shore to the height of 500 or 600 feet. On the western shore of the peninsula, and about a mile SE. of cape Valiente, one of these hills terminates in a peak 722 feet high, which, being much higher than any other summit on this part of the coast, is a most remarkable object, and excellent guide from a long distance.

Chiriqui rocks.—From Chiriqui point, a coral ledge, called Chiriqui rocks, extends about WNW., 1½ miles, and terminates at a small barren rock, 10 feet high and steep-to, within which are several rugged, rocky islets, from 50 to 150 feet above water.

Valiente breaker, NE. ¾ N., 1½ miles, from the extremity of cape Valiente, is a very small head of 3 fathoms, steep-to, which breaks heavily when rollers prevail, even in the finest weather, and is extremely dangerous. Between it and Chiriqui rocks, there are depths of 9 and 10 fathoms, and between it and the Tiger cays, the channel is ¾ of a mile wide, with 6 to 9 fathoms. Little Toro rock just open of cape Valiente leads close to the westward of the breaker. The Toro rock is a most remarkable, small sugarloaf islet, 100 feet high, which, lying close off the end of the Bluefield inlet, cannot well be mistaken; but the current, aided by the outset from the lagoon, runs out so strong, and the swell is so heavy, that it is by no means a safe channel to work out of, nor for a stranger to enter; for the rock only shows itself by the breaker, which may not occur for long intervals.

The Tiger cays, which bound the north side of the Valiente channel, consist of three small, red clay islets, about a mile in extent, from east to west. The easternmost, and largest, lies N. ½ E., 1½ miles, from cape Valiente, and is covered with brushwood; but on the others are trees, with their tops about 35 feet above the sea; the cays are connected, and surrounded at a short distance, by a coral ledge, almost dry, preventing landing anywhere, although it is steep-to.

Tiger rock.—At 1200 yards, NW. by W. ¾ W., from the westernmost of the Tiger cays, lies Tiger rock, a small, detached rock, 6 feet above the sea, and steep-to, having 14 fathoms water between.

Tiger breaker, situated 800 yards, NW. by W. ¾ W., from Tiger rock, is a small, isolated breaker, also steep-to, and extremely dangerou s

for it does not always show itself. From Tiger breaker, Valiente peak and cape are in line, and Toro cay bears S. ¼ E.

Valiente cays.—From cape Valiente, the western face of the promontory turns sharply in a southeast direction, for 1¾ miles, and is fronted by a shallow coral bank, extending 1¼ miles; the north side of this bank is bounded by a range of small islets and rocks, forming the southern side of the Valiente channel, which is here 1½ miles broad. Near the western edge of the bank, there is also a small, low rock.

These islets and the Tiger cays appear to be of precisely the same formation as those we have described lying close off Escudo de Veragua; those off cape Valiente are equally remarkable, being perforated in the same way, and crowned with cocoanut trees; they appear to be wasting from the action of the waves, and one has been washed away.

Bluefield creek, situated on the south side of cape Valiente, is 4½ miles in extent, east and west, but the south side of the creek is so indented that its breadth varies considerably. The narrowest part of the entrance is 800 yards across, but within, it is nearly 1¼ miles wide, in some places, and has a depth sufficient to receive vessels of large draught, in perfect security.

The interior is exceedingly picturesque; the vessel will appear to lie in a deep valley, the gorgeous, densely-wooded hills rising on the north side, to the Valiente peak, and on the south side, to an elevation of 180 to 500 feet. The eastern end is swampy, and bounded by low mangroves; from the northeast corner, a pathway leads across the narrow isthmus which connects the peninsula to the main; and at the southeast corner, a small narrow ridge of irregular hills rises to the height of 640 feet.

On the south shore of the creek, in a small plain to the eastward of Carolina point, there is a small stream of excellent water, and all around the Valiente peninsula may be seen detached huts of the Valiente Indians, with small cultivated spots here and there. The huts of this tribe will be elsewhere met with, scattered around the adjacent lagoons, and at the entrances of the small rivers on the coast, but this is the only spot where they appear to have formed a regular settlement; sometimes, however, the peninsula will be found entirely deserted, for, in their long fishing and hunting excursions, they are accompanied by their whole families.

Scrubby point, the southwest entrance point of Bluefield creek, is low and woody; it is the northeast extremity of a narrow neck of land, ¾ of a mile in length, which terminates to the southwest at Bluefield point, the east point of entrance to the Chiriqui lagoon.

Supplies.—Water may be obtained from the stream on the south shore, from which a shallow flat extends some distance, but by means of a long hose the water can be conveyed into the boats. Wood will be found all around, but, when time is not an object, it will be better to proceed to the Zapatilla cays for this purpose, where there will be less

risk to the health of the crew. The seine may be hauled with great success, in any of the sandy bays, but it is necessary to be prepared to meet with small alligators, and to be careful that the people are not electrified by the torpedo.

The papau, a most excellent vegetable, grows almost wild all around the inlet; and the banks of several of the streams on the main afford an abundant supply of bananas and plantains. There is also fair hunting, but it is attended with some risk. The dense, rank underwood is infested with snakes of the most venomous description, and the warri, a ferocious animal, and a season seldom passes without a fatal accident occurring among the sarsaparilla pickers.

Bluefield point is a bold, bluff, wooded headland, 180 feet high, and consequently easily recognized. About 200 yards to the westward of it, there is a small, black rock, 6 feet out of water, the western side of which, as well as the southwest extremity of the bluff, is steep-to.

From abreast the black rock, a sandy beach, backed by mangrove swamps, trends NE., 600 yards, and from the north end, a dry coral ledge extends about 200 yards, to the Little Toro rock.

The Toro cays, situated about ½ mile westward of Little Toro rock, are small islets, lying so close together that they generally appear as one narrow island, about ¼ of a mile in length, from north to south. They are formed of dark indurated clay, in which are imbedded thin spiral layers of pebbles and stones, and their summits are covered with wood. From a northeast and southwest direction, the southernmost of these cays are seen to rise perpendicularly from the sea, and have a similar appearance to those off cape Valiente. The ground is all foul inside of them, and a ledge extends from the northernmost, NNW., 400 yards; there are 5 fathoms at 400 yards to the westward.

Bluefield rock, a small, perpendicular, black rock, 32 feet high, with two or three remarkable trees on its summit, is easily recognized from the westward; it lies on the edge of the Valiente bank, 800 yards to the northward of Creek point, and marks the narrowest part of the channel into Bluefield creek.

Directions for Bluefield creek.—The extremity of the Toro ledge bears W. ¾ N. from Scrubby point, and from it to the nearest part of the Valiente bank, the channel into Bluefield creek is a mile wide, with 11 to 18 fathoms water, except about midway, where there is a depth of 8 fathoms. Both the edge of the Valiente bank and the opposite bold projecting points, which separate the bays, are steep-to, but the bays themselves are very shallow within the lines of the points.

Vessels having occasion to visit Bluefield creek had better enter by the Tiger channel, taking care in so doing to give the Tiger breaker a wide berth, and not to haul in to the southward until the Toro cay bears eastward of S. by E. By waiting until the sea breeze is established, the channel may be navigated without the necessity of making a

board; steer towards Bluefield point, taking care not to bring it to bear westward of S., to avoid the edge of the Valiente bank, until the hummock on the south end of the Bluefield ridge, at the head of the creek, is in line with Carolina point, ESE. ½ E.

This mark will lead nearly in mid-channel, to the narrowest part, when the anchorage may be steered for. It will be better, however, not to go farther in than to bring cape Valiente in line with a remarkable bluff, named Observatory point, which lies a short distance to the southward of it, and anchor in 11 fathoms, mud, with a large hut on the summit bearing NNW., and Bluefield rock about W. by N. A position to the eastward of this loses the advantage of the breeze, by no means desirable in so confined a valley, and in such a fearful climate as this.

Tides.—It is high water, full and change, in Bluefield creek at 12h. 30m., and the rise is about a foot; there is no perceptible stream on the flood, but the ebb will assist a vessel in working out.

Chiriqui lagoon.—The Chiriqui lagoon is 32 miles long, from east to west, 12 miles wide in the center, 5 at its east, and 10 at its western extremity, and is capable of receiving, in security, vessels of heavy draught. The entrance, between Bluefield point and Water cay, is 3½ miles wide, and, being open north and south, is very easily recognized. Bluefield point has already been described as a bold, rounded headland. Water cay is low, flat, and densely wooded, the tops of the trees at the east end reaching to the height of about 120 feet above the sea. The eastern end of this cay is formed of low, red clay cliffs, and very close off the eastern extremity there is a small, dry rock, which, on a NNW. ⅛ W. and opposite bearing, seen just open of the point, is the leading mark into the lagoon. A reef, on which the sea breaks heavily, stretches off from it, 300 yards, and skirts the whole of the northeast side of the cay; at the distance of 600 yards from the east point, the depth is 5 fathoms.

The north side of the interior of Chiriqui lagoon is thickly fringed with detached shoals and coral heads, steep-to; and the main entrance itself, although from ½ to 1 mile in breadth, is so intricate, that, with sailing vessels, it should only be taken with the sea and land breezes. These shoals extend to a distance of 4½ miles to the southward of Bluefield point, and so block up the east end of the lagoon, that that part is only navigable for small handy vessels; the navigation is not difficult, for the water is so clear that the eye can guide from aloft. The mangrove creeks, at this end, are so deep that they afford ready places for concealment.

The eastern and southern shores of the lagoon, for a very considerable distance inland, as far as Man creek, 17 miles from the east end of the lagoon, are low and swampy; and there are only a very few spots in this space where a landing can be effected.

At Man creek, the base of a great spur from the Cordillera reaches the shore, and, only 2 miles inland, has an elevation of 2,672 feet. This

lofty ridge extends about 5 miles to the westward, when the Chiriqui valley, from 3 to 5 miles wide, separates it from another ridge, 2,840 feet high, at the southwest end of the lagoon, about 2½ miles inland. At the foot of each of these ranges there is a trading post.

The south side of the lagoon, westward of the Chirica-Mola, is free of danger, and may be safely navigated by the lead. The west side is low, swampy, and uninhabited; it is skirted by a coral ledge, from a ¼ to ¾ of a mile distant, with 6 and 7 fathoms close to.

The first stream that flows into the southeast corner of the Chiriqui lagoon is the Catabella creek; it is very small, and will only admit canoes to a short distance. Formerly, at the distance of about an hour's paddling, there was a trading post, from whence a path led to the Chirica-Mola settlement.

Toro creek, or San Diego river, empties about 3½ miles westward of the Catabella, and communicates with the Chirica-Mola, just below its rapids. To the westward of the entrance there are a few fishermen's huts.

The Chirica-Mola river is the only stream of any magnitude in the lagoon, and enters it 4 miles to the westward of Toro creek. It has formed a small delta, which projects out to a well-defined sandy point at the entrance, S. by E., 9½ miles, from Bluefield point. On its eastern side, about 1½ miles from the entrance, the shore forms a small cove, named Irish bay, which has 3 to 4 fathoms, under the mangroves. Small trading coasters generally collect their cargoes here, from the small settlements around, and lie completely hidden by the high trees.

A small, low, mangrove island divides the mouth of the Chirica-Mola into two channels, the eastern of which is alone navigable, and on the bar, during the dry season, there is less than 2 feet of water. At this period, the water is brackish about 2 miles above the entrance. The banks are low and inundated for a distance of about 3 miles, whence they rise, and, at the first rapids, are 7 feet above the river. To this point, a distance of about 12 miles, the stream varies in breadth from 100 feet to nearly 600 feet, and in depth from 2 to 12 feet. About a mile below the rapids, on the left bank, there is a small cleared spot and temporary hut; and a mile below this, there is another hut, on the right bank, which affords shelter from the rains. As already observed, at the commencement of the rapids a branch of the river turns to the southeast, forming the Toro creek. Above the rapids, the bed of the river is so full of rocks, that its ascent can only be accomplished in small strong canoes, and with very great labor.

Settlement.—About 10 miles above the landing at the rapids, on the right bank, is the most considerable village of the Valiente Indians, and a trading post has been established here for a long time. Cotton and hardware manufactures are brought from Jamaica, and bartered for sarsaparilla, vanilla, cattle, and hides. The situation is said to be

healthy, and communicates by foot-paths with the Biarra and Catabella creeks.

The coast westward of the Chirica-Mola forms a bight, 5½ miles wide, and about 3 miles deep; the interior consists of small mangrove lagoons, in which the manati is frequently captured. The west end of this bight terminates at the entrance of the Warri or river Biarra, the eastern entrance point of which forms a well-defined, and easily recognized projection. The entrance of the Biarra is about 20 feet wide, and on the bar, there is only a foot of water in the dry season. Canoes ascend to the first rapids, about 8 miles from the mouth, where there is a small settlement. From this river, the mangrove shore of its delta again recedes inwards, and curving to the northwestward, forms a large bay, about 8 miles wide and 3 deep. About 3 miles from the Biarra, at the foot of the high lands already described, is the entrance of Man creek; which, in the rainy season, is navigable for canoes, two days' journey.

From the bottom of the bay, a shallow bank extends out nearly 2 miles; and in the southwest corner, by the side of a rivulet at the base of the hills, there is a trading post.

Thence the coast is low and swampy, forming the delta of the Chiriqui, which river enters the lagoon at the northwest point of the bay. The shore in this space is closely skirted by a coral ledge, steep-to. The entrance of the Chiriqui river is so small, that a stranger will have great difficulty in discovering it among the narrow openings in the mangroves. In the dry season the bar is impassable, except by hauling over it; and in the heavy rains, the numerous rapids are too formidable even for canoes.

From the Chiriqui, the low swampy shore, which bounds the Chiriqui valley, trends westerly, 5 miles, to Frenchman creek. About midway is the Cabbage creek, which is of no importance.

Frenchman creek emerges at the base of the lofty ridge which forms the west side of the Chiriqui valley; and, although unnavigable, taking its rise in the adjacent mountains, it is a constant running stream of excellent water. The land to the southeastward and westward of it is firm, and wooded all the way to the southwest corner of the lagoon, and, being free of morass, the locality has been well chosen for the establishment of a trading post. The residence of the settler stands on the west side of the entrance of the creek, and around it is a small cultivated space, which is most fertile in the production of all tropical fruits and vegetables. This end of the lagoon also abounds in turtle, in the season.

The position, indeed, has been found to be so favorably situated, and, comparatively, so healthy, that a bridle path has been opened along the west side of the Chiriqui valley, and across the mountains to Ciudad David, near the Pacific, by means of which cattle have been brought from thence to this spot, and then conveyed in canoes to the Boca del

Toró settlement, in three days. The shore is here quite clear, and there is excellent anchorage in 7 fathoms, about ½ mile distant. Numerous small streams descend from the table ridge, into the west side of the lagoon, but the Robalo is the only one navigated by small canoes.

Robalo river entrance lies near the southwest corner of the Chiriqui lagoon, on the north side of a shallow mangrove bay, about 2 miles westward of Frenchman creek. Although very narrow, it is navigated by the sarsaparilla pickers, in their little canoes, two or three days' journey, according to the state of the river. At the end of one day's paddling, rapids are met with; and, after two days' ascent, it receives a small stream from the southward, which throws so large a body of water into the main branch as to render it almost impassable after very heavy rains. The banks are said to be densely covered with trees of the largest dimensions.

Popa island, which forms the northwest boundary of the lagoon, is of moderate elevation, but at the north end there is a very remarkable isolated hill, named mount Popa, with a rounded summit 1,300 feet above the sea, and is a serviceable object. The south side of the island is covered with trees, termed by the traders Sum wood, which grow to large dimensions, and are conveyed to Cartagena for ship-building. Good coal has been found on this island. There is a channel into the lagoon between Water cay and Popa island, with not less than 6 fathoms water, but it is too narrow and tortuous for a stranger to navigate. Between the west side of Popa island and the main, there are narrow deep channels leading into Almirante bay, navigable for large bongos and launches.

Water.—The best place in the lagoon to water, is at Frenchman creek. There is also an excellent and convenient spring in the little sandy bay on the east side of Bluefield point, off which there is anchorage; it is, however, difficult to get at, and so exposed as to be dangerous with strong westerly breezes and land winds.

Directions for Chiriqui lagoon.—Vessels bound into the Chiriqui lagoon, with the sea breeze, should approach by the Tiger channel, which, between Tiger breaker and the east end of Zapatilla reef, is 4 miles wide. After passing southward of the breaker, the opening into the lagoon is readily distinguished; and a course should be shaped to pass from ¾ to 1 mile from the east end of Water cay. From this, a southerly course must be taken, until the west extreme of the Zapatilla cays is in line with the eastern extremity of Water cay, bearing NNW. ¼ W., taking care to bring these marks on before Valiente peak is in line with the south end of Toro cays.

Or, when the extremities of Water and Zapatilla cays are in line as above, a very small rock, 3 or 4 feet above the sea, close off the north side of Water cay point, will be seen just open of it; and this mark will

lead between the shoals; when Valiente peak is over a hut at the east end of a small, sandy bay, on the east side of Bluefield point, bearing NE. by N., a vessel will be inside them, and may shape her course as convenient. It is necessary, however, to observe, that it will not be prudent for a large vessel to go to the eastward of the Chirica-Mola, to the entrance of which the leading mark, or the same course, will carry her.

The rock off Water cay lies so close to the point, that it must be used very cautiously as a mark, and only when the Zapatilla cay is not seen; as the tops of the trees on the west end of the latter cay are only 80 feet above the sea, it will perhaps be necessary, and safer, to guide the vessel from aloft, so as to keep that mark in sight as long as possible, instead of trusting to the rock and bearing.

Very great attention is requisite, for the water at entrance of the lagoon is so discolored, that the shoals cannot be seen; and as they are steep-to, with deep and exceedingly irregular soundings, the lead is almost useless; and there is only a space of about 400 yards to spare from the shoals on the west side of the channel.

There is another channel to the westward of the above, full ¾ of a mile wide, from east to west, but so difficult of access, for want of marks, that, without the assistance of a pilot, it is dangerous to navigate. However, with some local knowledge, the following directions will assist to guide safely into the lagoon, in a case of necessity.

Pass, as before, at the same distance eastward of Water cay, and when Water cay point bears W., steer about SSW., until it bears N., thence a S. course will lead through between the shoals, at the distance of about 800 yards.

If bound to the southwest part of the lagoon, when Valiente peak is in line with the north side of Bluefield point, a course as most convenient may be pursued; but if bound to the Chirica-Mola, it will be necessary to stand on until Valiente peak bears NE. ½ N., or Popa hill NW. ½ N., when a SE. ½ E. course will lead to the entrance of that river.

In leaving the Chiriqui lagoon, it will be necessary to wait for the land wind, either in the evening, if it comes off early, which it very frequently does, or in the morning, soon after daylight. To run through the eastern channel, the leading mark must be brought on from a position well to the southward, with Valiente peak bearing to the northward of NE. by N. Steer out, with the east end of Water cay in line with the west end of the western Zapatilla cay, NNW. ¼ W., and when Valiente peak comes in line with the east side of Bluefield headland, NE., you will be between the outer shoals, and a N. course will lead clear, out to sea.

To run out by the western channel, the east point of Water cay must be brought to bear N. (the course through), before mount Popa bears westward of NW. ½ N. When Valiente peak is seen over little Toro cay, NE. by E., the shoals will be cleared, and a course to sea may then be shaped.

Should it be necessary to work up from the west end of the lagoons, the north shore must be approached very cautiously, for no marks can be given to avoid the shoals off that side. As the south side can be navigated by the lead, it will be better not to stand more than about half way across from that shore, until the leading marks for the channels are nearly on.

Tides.—The spring rise in the Chiriqui lagoon is about 1 foot, but the establishment is not known. In the interior of the lagoon, there is seldom any tidal stream, but an outset to the northward, according to the state of the rivers. In the dry season, from March to June, off the Chirica-Mola, and as far out as the entrance of the main channel, the strength of the ebb is from ½ to 1 knot an hour, and there is sometimes a weak flood stream; but outside, and in the small channels to the westward, there is a continual outset, running at the rate of 1 or 2 knots, and after long heavy rains even as much as 3 knots in the main channel.

Zapatilla cays.—The west side of the outer part of the Tiger channel is bounded by two narrow sandy islets, named Zapatilla, which appear as one island on a WNW. bearing. They are each a little more than ½ mile long, and about 1,200 yards apart, a ledge almost dry joining them. Both are thickly wooded, affording excellent fire-wood, easily obtained, and the tops of the trees are about 80 feet above the sea.

The surrounding reef extends ESE. 1 mile from the easternmost, the extreme bearing WNW. ¼ W., 4¼ miles, from the Tiger breaker. Near the extremity, the reef is ½ mile broad, and generally shows itself; but it skirts the north and south sides of the cays at only a short distance. From the westernmost cay, it stretches off a mile in a northwest direction, and at this extremity is 1 mile broad; between it and the reef off Patiño point, there is an intricate channel, about ¾ of a mile wide.

Anchorage.—On the south side of Zapatilla cays, good anchorage and the best shelter will be found in 10 fathoms, sand and mud, with the west end of the westernmost cay bearing N. ½ E., about 1 mile distant. The soundings are very irregular, and change suddenly, in some parts, from 6 to 12 fathoms.

Caution.—The edge of soundings lies about 6 miles northward of the Zapatilla cays; but further west the edge is close to the land; at night, or in thick weather, if eastward of the Zapatilla cays, a vessel might stand in until the first sounding is obtained; this must be done cautiously.

Crawl cay channel.—At the head of the bight formed by the islands southwest of the Zapatilla cays, between Popa and Provision islands, is the Crawl cay channel, leading into the Almirante lagoon. This cut has depths of not less than 5½ fathoms, between detached coral shoals, but it is so intricate and narrow, being in some parts not

100 yards wide, that it is quite impossible to give safe directions for its navigation. The sea, however, is so tranquil and clear that every coral head is easily seen; and the tidal stream being weak, the pilotage may be effected by the eye from aloft, provided the weather be clear and favorable, and the sun not ahead.

The entrance is about 300 yards in width, but so hidden by mangrove cays within, that it would be impossible for a stranger to make it out, and the shore is far too dangerous to approach without being certain of the channel. There is a conspicuous saddle-shaped hill, 670 feet high, situated about SW. by W. ½ W. of the anchorage off the Zapatillas, the south hummock of which, when brought to bear about SW. by W., and in line with the northwestern extremity of Popa island, will lead to the opening.

The north part of Popa, being formed of lofty trees growing straight out of the water, appears from this direction bold and distinct; and the end of the reef which runs to the NE. off Cobbler point, ¾ of a mile, and forms the east side of the entrance, is steep-to, and breaks heavily.

Almirante bay is about 13 miles in extent, from east to west, but its interior is crowded by small islands, and its shores are so irregular, that, from north to south, the breadth varies from 2 to 13 miles, and, near the middle, the bay almost forms two basins. In consequence of this, it may be said to possess harbors within harbors, in which vessels of the largest class may enter without much difficulty, and in many places lie alongside the shore in security.

The south side of Almirante bay is bounded by a remarkable ridge of table hills, lying at the base of the great Cordillera, extending, southeast and northwest, about 15 miles; in some places it rises precipitously from the shore to the height of 600 or 700 feet, and, only 2 miles inland, reaches an elevation of 1,748 feet, which increases to 2,000 feet at its northwestern extremity. Several small streams descend from these heights into the southwest and west sides of the basin, but they are only navigable for a short distance, by small canoes. The east and west sides are very low and swampy, and densely wooded. The north side is bounded by Provision and Columbus islands, between which is an entrance for large vessels, and between Columbus island and Sarepta point, another of greater depth.

Provision island, the easternmost of the two, is 8 miles long, east and west, with a ridge of irregular hills on its north side, from 300 to 400 feet high. On the south side of this ridge, the land is low, swampy, and skirted by numerous mangrove cays, with boat channels between, which extend all the way to the Crawl channel. The northeast side is foul, and the sea breaks on it with great violence to the distance of ¾ of a mile from the northeast point. Cape Torro, the northwestern extremity of the island, is a bold, scarped headland, easily recognized. There is a small, black rock, steep-to, about 300 yards NE. of it. A reef,

steep-to, and on which the sea generally breaks, extends west, nearly ½ mile, from the cay.

The west end of the island terminates at a low, sandy point, upon which there is a small settlement, and the land about it is so fertile in the growth of tropical fruits and vegetables, that it gives the name to the island.

Columbus island is 7 miles long, northwest and southeast, and about 3 miles broad; it is flat, and densely wooded, the tops of the trees being from 200 to 400 feet above the sea. The northeast side of the island is bounded by a white sandy beach, which forms two slight bays, and from Long bay point, which separates them, a dangerous reef extends to the northeast, 1¼ miles, breaking heavily in fresh breezes. The outer end of this reef lies NNW. ½ W., 3 miles, from cape Toro, and the edge of soundings is only ¾ of a mile distant.

The northern extremity of the island is low and rocky, and from it a ledge of rocks extends northwestward, 1½ miles, but being dry in places, and having on it some remarkable islets which serve as marks, it is not so dangerous. Sail rock, the outermost of the above islets, lies at the extremity of the ledge, and rises to a height of 40 feet above the sea; it is a barren, black rock, steep-to on its west and north sides.

Swan cay, situated SE. ½ E., ½ mile, from Sail rock, is a narrow rock, about 70 yards long, rising perpendicularly to an elevation of 180 feet, and crowned with brushwood and a few cocoa-nut trees. There is no safe passage between these cays and North point.

The western extremity of Columbus island is low and sandy, and about a mile distant from the adjacent point on the mainland; upon it there is a small scattered settlement. The south shore is low and swampy, and bounded by mangroves, which are closely skirted by a coral ledge, steep-to.

Settlement.—The principal settlement, called Boca del Toro, and the seat of government on this part of the coast, is on the southeast end of Columbus island, on a narrow peninsula, faced on the north by a shallow bay, open to the northeast, and available for boats only. There are about 1,000 inhabitants in the place, Indians, negroes, and Spanish Americans. The exports are rubber, cocoa-nuts, and sarsaparilla.

The trade, principally in the hands of a few Americans, is carried on by schooners to Aspinwall, thence by steamers to New York.

Supplies.—Fresh beef is scarce, and of poor quality; pork and poultry can be had in moderate quantities, but at high prices.

Preserved provisions, salt meats, and bread are imported by trading firms, but a large stock is not kept on hand.

Good fish are plentiful in the bay, and game is said to be abundant on the mainland.

Water.—Rain-water is all that is to be had; it is contained in an iron tank (an old boiler) of a capacity of about 6,000 gallons.

Coal.—There is no imported coal in the place, but coal of fair quality can be mined in the immediate neighborhood, and at very moderate cost, by using native labor.

Boca del Toro, between Provision and Columbus islands, is the principal channel leading into the lagoon, and between Provision island and Careening cay, close off Columbus island, it is about ¾ of a mile wide. Both sides, however, are skirted by a coral ledge, so that in the middle, in the narrowest part, it is only about ¼ of a mile across. In the middle of the channel, and across the Garcia bank, or middle ground, which lies just within the lagoon, a depth of not less than 5 fathoms may be carried; and, if buoyed, 6 fathoms could be maintained.

The edges of the reefs, on the Provision island side, generally show themselves, but the water is so muddy at the entrance, that the shoals there are not visible, and as Long Bay point is dangerous, a stranger will require a pilot.

Directions for the Boca del Toro.—In a case of necessity, or with but little local knowledge, the following directions for the Boca del Toro will be useful, and, to vessels drawing under 17 feet, quite safe.

There is not much difficulty in recognizing the entrance, cape Toro being a remarkable bold headland, but it must be approached from a northeast direction at a wide offing, and with the sea breeze. When the channel comes fairly open, bearing S. by W. ⅞ W., a very remarkable large tree on Cristoval island will be seen in line with a conspicuous peaked hill on the northeast angle of the Table ridge, on the south shore of the lagoon, below the highest ridge of mountains. This mark will lead about a mile to the eastward of the Long Bay reef, through the narrows, to within less than 200 yards of the Solarte shoal; and when the little fort at the Settlement point is seen open of the south end of Careening cay, a SW. ¼ W. course will lead across the deepest part of the middle ground, in 4 to 5 fathoms, when anchorage may be taken as most convenient, in 12 or 13 fathoms, mud, provided Careening point does not bear eastward of N. by E. ½ E.

The south end of Careening cay is sufficiently steep for a vessel to heave down alongside; and between it and the Fort point there is a 12 foot channel, admitting coasting vessels to a more sheltered anchorage off the settlement.

In leaving the lagoon, by the Boca del Toro, it will be necessary to wait for the land wind. To attempt working out against the heavy swell which usually rolls in, would be attended with considerable risk, notwithstanding the assistance of the outset; and, if caught at the entrance by the sea breeze, it will be more prudent for a vessel of heavy draught to run back. It is also necessary to be cautious not to haul

out to the northeast, before cape Toro bears E. ½ S., to avoid the reef from that point.

Tides and current.—It is high water, full and change, in the Boca del Toro, at 12h. 15m., and the rise is from 1 to 1½ feet. There is no flood stream, but a continual outset, depending upon the rains; in the dry season its strength is about a knot. The great easterly eddy sets on to the cays off the north side of Columbus island, at the rate of 1 to 2 knots, and it will be met with off the Boca del Toro soon after they bear southward of W.

Boca del Drago, the western entrance into Almirante bay, is only ¼ of a mile wide, in the narrowest part, and ⅛ of a mile at the entrance; and, although affording a depth of 9 fathoms, is so tortuous, and exceedingly sharp in its turnings, that it is too difficult for a stranger to navigate, without the aid of a pilot, who will come off from the settlement on seeing the usual signal.

Supplies.—Water is scarce, but a small supply of vegetables may be obtained at the settlement, and there is excellent firewood on the western shore.

Tirbi point forms, with Sarepta point (the west entrance point of Boca del Drago), the front of a small neck of low, woody land, about ¾ of a mile broad, skirted by a reef on which the sea breaks heavily. As before stated, the easterly current sets strong against this reef, and in approaching the Boca del Drago, should it fall calm, a sailing vessel must immediately anchor, to prevent being thrown either on the reef or the small islets northward of Columbus island. The following directions, however, with the plan, will be of service in a case of necessity.

Directions for the Boca del Drago.—To enter the Boca del Drago, which can only be navigated under sail with the sea and land breezes, the opening should be brought to bear S. ¼ W., when a remarkable large tree on the extremity of Lime point, Columbus island, will be seen in line with an equally conspicuous square clump, resembling a tower, on the table ridge at the bottom of the lagoon, and a little below and to the westward of it will be seen, at the same time, Tristan or Pondsock point, which, although formed by tall, straight, flat-topped trees, has the appearance of a low bluff headland. Lime point tree and Tristan point in line leads nearly in mid-channel, but the same tree on with the clump on the ridge leads less than 200 yards to the eastward of the Mandeville rock, which is extremely dangerous, as it does not show itself, and is steep-to.

Proceeding in with either mark, it will be necessary to bear up as short round as possible, when Norte point is seen just open of Cauro point, NNE., keeping it so, until within about 300 or 400 yards of the western shore, which is steep to the edge of the reef, and then haul up

quickly S. by W., through the inner part of the narrows. When Cauro point bears NE., or Swan cay is open twice its breadth northward of it, the bank off Lime point will have been passed, and a SE. ¾ S. course will lead into the lagoon, in not less than 5 fathoms, where anchorage may be taken up as most convenient, under Columbus island.

Tides and current.—The tides at the Boca del Drago are similar to those at the Boca del Toro; but the easterly current sets against the ledge off the north end of Columbus island with such force, that it is turned to the southward, and, overpowering the ebb, runs into the lagoon at the rate of a knot an hour.

Caution.—The circumstance just noticed adds to the dangers of the Boca del Drago, and a vessel meeting with a calm, or light airs, between the Sail rock and the entrance, or becoming unmanageable, should anchor at once, and await a commanding breeze. The turnings in the narrows being so sharp, the utmost attention must be paid to the sails, to maneuver quickly; and, if time permit, it will be safer to place a boat at the junction of the leading marks.

H. M. S. *Cordelia*, 1865, found depths of 4 fathoms in the inner part of the channel, where 6 fathoms formerly existed.

Shepherd harbor.—Of the many small basins formed by the islands off the south shore, the largest and most favorably situated lies at the southwest end of Almirante bay, and is named Shepherd harbor. It is about 4 miles in length, northwest and southeast, and from 1 to 1¾ miles in breadth, with a depth of 12 fathoms on muddy bottom.

On the northeast side, it is bounded by Shepherd or Iguana cay, which is 1½ miles long, east and west, about ½ mile broad, and, in the highest part, 264 feet high. From the southeast end of the island, a narrow coral ledge stretches off to the southward, about a mile, upon which are several cays, the two largest named Garcia and Roldan. The channel between the south end of Roldan and the main is nearly ½ mile wide. From Snapper point, which forms the south point of entrance, a ledge, nearly dry, and steep-to, projects to the northward, 300 yards; but Roldan is bold-to within 100 yards; elsewhere it is quite clear, with a depth of 15 fathoms.

The western channel, between Shepherd cay and Iguana point, is about ½ mile wide; the cay is clear to within 100 yards, but from Iguana point, a coral ledge shows itself to the distance of 200 yards, and is steep-to. All the dangers in the interior of the harbor are confined to the south shore, and easily seen from aloft; and the coral ledges, which fringe most parts of the mangrove shores to a short distance, are so bold that a vessel may lie close to them. Secure anchorage may be taken up anywhere, as most convenient for watering, wooding, or refitting, and, in many parts, large vessels may lie alongside the shore. Shepherd cay is not inhabited. The chief supplies are grown on the banks of the streams

on the mainland, principally at Saurian and Cultivation creeks; here the land is of extreme fertility, and produces all the tropical fruits and vegetables, cotton, coffee, and the sugar-cane in the greatest perfection, and with very little labor.

The dense forest around the lagoon also yields abundance of most excellent ship timber. The most valuable timber is the Eboe tree, which has a diameter of from 3 to 4 feet, and grows straight, from 50 to 60 feet, with large spreading arms having crooks of all forms and dimensions. The Zapatilla attains about the same height, and is from 2 to 3 feet in diameter, but, being rather brittle, it requires caution in felling. The Sum-wood, called also Spanish elm and Caparo, is of the same dimensions, saws and works well, and is well adapted for planking, as it resists the trying effects of this climate better than the woods generally used for this purpose; this tree is also found on Popa island. Cedar also grows to great size and perfection, and is used for the construction of large canoes, dories, and pitpans.

Water.—Four small streams flow into the south side of Shepherd harbor, but they are only navigable for small canoes for a short distance. The largest is Saurian creek, and it is the best at which to water; a vessel of the largest class may be conveniently and safely moored for the purpose, within 400 yards of the mouth.

Directions.—Having entered Almirante bay, if proceeding from the Boca del Toro, the north end of Cristoval island must be approached cautiously, to avoid a small coral ledge which lies NW. ¼ W., ¾ of a mile, from Coco point, the northern extremity of the island; the channel is about 1½ miles wide, with a depth of 15 fathoms. In running or working, Juan point must not be brought westward of SW. by W. ½ W. until the ledge is passed.

The northwest end of Cristoval island is foul to the distance of about 400 yards, but from Tristan point, on the western shore of the bay, a flat coral ledge, dry in places, extends 1½ miles to the eastward, having 3 and 4 fathoms on its outer edge, leaving a channel 1¼ miles in breadth. The Cristoval side must, therefore, be kept aboard; it is everywhere bold within 400 yards, and, should it be necessary to work through this part, the little white lookout hut on the highest part of Shepherd island must not be brought to the southward of S. by W. ½ W., when standing to the westward.

The southeast end of the Tristan reef lies with Mangrove point well open of Juan point. To the southward of this there is no danger; either channel may be taken into the harbor, but the southeastern will be the most convenient with the sea breeze, and all that is necessary is to steer in mid-channel, or work in by the eye.

From the Boca del Drago, after passing Lime point bank, care must be taken to haul well to the eastward, to avoid a coral bank extending from Donato point on the western shore, the outer end of which bears

S. ½ W., nearly 2½ miles, from Lime point. Tristan point must also be very cautiously approached, and Juan point not brought to the northward of E., or a depth of not less than 10 fathoms be maintained before Shepherd hut bears to the westward of S. by W. With the hut bearing S. by W. ½ W., the end of the ledge will be crossed in 5 fathoms.

The Coast.—On the west side of Tirbi point, the shore forms a dangerous bight, for about a mile, when it trends NW. ½ W., in a straight line, for 22 miles, to Carreta or Monkey point. It is throughout low, swampy, and bounded by a dark sandy beach, and, as far as the Changuené river, is fringed by a reef upon which the sea breaks with great fury.

Changuené river empties about 7 miles from Tirbi point, and is said to mark the boundary between the republics of Costa Rica and New Granada; this, however, is disputed. On the east side of the entrance there are two huts. It has, at times, 8 feet water on the bar, and is navigated by large canoes several days journey. The principal article obtained from this river is sarsaparilla, but fear of the Blanco Indians has prevented the establishment of a regular trading post in the interior.

CHAPTER VIII.

CHANGUENÉ RIVER TO CAPE GRACIAS A DIOS AND PATOOK RIVER, WITH THE OFF-LYING BANKS AND ISLANDS.

General remarks.—Throughout an extent of 300 miles, from Porto Bello to San Juan de Nicaragua, Chiriqui lagoon is the only secure harbor for vessels of large draught, Greytown being nearly closed up and rapidly decreasing, both in extent and depth. Nowhere else is there safe anchorage, even for the small coasting vessels which pay their periodical visits to the trading-posts; and so furious a surf breaks upon the shore, that landing is at all times difficult and often dangerous.

Climate.—The temperature in the dry season seldom exceeds 80° Fahr., and in the wet 86°, and the surface water is much the same as the air. The climate, even at its most favorable period, is of a character most unhealthy, owing to the incessant rains which deluge the land, with scarcely a remission of a month. March, April, May, and part of June are generally the driest months, but they are by no means certain to be fine. This continual rain, however, appears to be confined to the coast, and probably does not extend more than about 30 miles from it, the limit of the easterly current; for at Corn island the dry and wet seasons are so regular, that cultivation is successfully conducted accordingly.

Wind.—During the period from March to June, within a few miles of the shore, land and sea breezes alternate, but the former generally preponderates, and comes off from the SW. and W., not directly from the land; so, in like manner, the sea breeze blows slantingly in from the eastward; and they both frequently rush down in a sudden gust, which should be well prepared for. In the later months of the year, fresh westerly winds prevail, called by the old Spanish mariners Vendavales; and between November and February, Northers will occasionally reach thus far, but their force is considerably moderated after passing to the southward of the islands. Along the Mosquito shore, from Truxillo to Honduras, and as far north as Bacalar, from January to June, the regular trade-wind prevails; but interrupted in the first two months, from time to time, by Northers. In July, August, and September the wind generally comes from the SE., although heavy SW. squalls, and calms, are frequent. In October, November, and December the winds blow from the SW. and NW. quarters, frequently with heavy gales from WSW. to WNW. and N.

Hurricanes do not appear to visit this coast, but destructive gales happen in the rainy season, which destroy the crops, even at the adjacent islands. It is also subjected, at this period, to most violent tornadoes, to which no sail can be shown; but they do not last long, and are generally preceded by faint sheet lightning on the eastern horizon, which will give sufficient warning to seek shelter, when sailing among the northern cays.

On the Mosquito bank to the northward of Greytown, the seasons are more marked. The rains commence in May, sometimes as early as the first week, and last until November. During this period, the wind generally blows from NE., round by east, to SE. The Vendavales, or westerly winds, gradually disappear and become land breezes, which decrease in strength and distance from the shore, as cape Gracias á Dios is approached. Sometimes this breeze will blow over the lagoons to the shore, but no farther.

The weather at this season is extremely uncertain; the wind is generally fresh, often accompanied by heavy squalls, equal to tornadoes, with torrents of rain, thunder, and lightning; and occasionally small blue lights will be seen flickering at the weather yard-arms and trucks; the wind at the same time flying about in all directions in furious gusts. As stated above, hurricanes are said not to extend to this coast, but the northeastern part of it certainly lies within the verge of their limits.

From December to April is considered the dry season, but it is only comparatively so; still the weather is somewhat more settled, and freer from intense electric phenomena. N. and NW. winds will sometimes set in suddenly, and blow with considerable force for two or three days; they generally, however, give a few hours' warning, by dark masses of clouds collecting in those quarters; and it is observed that, instead of the wind drawing round previously to the southward, it veers from the eastward, by north, to northwest, then veers back again.

These winds seldom occur after the first week in March, when the turtling season commences, but they may be met with in the last week. The latter part of this month, and April, is the finest part of the year.

Currents.—The great eddy generally running to the southward along the Mosquito shore, and then following the curve of the land to the eastward, as far as the neighborhood of Cartagena, is here about 30 miles broad, and its velocity from 2 to even 3 knots in the rainy season; and that to the northward of this limit, there is usually a southwesterly set, varying in strength with the breezes; and veering to the northwestward, as the outlying islands are approached.

Navigation.—The navigation from east to west, and vice versa, is therefore easily conducted; in the former case by keeping to the northward of the eddy, until well to the westward of the point of destination, or in the latter, by means of its assistance and the land winds.

We may also repeat, that this easterly stream runs close home to the shore, and with increased rapidity as it approaches it, until it reaches the neighborhood of cape Valiente. Here it is checked by the projecting cays, and streams running out of the Chiriqui lagoon, and, being diverted to a more easterly direction, causes a slight westerly eddy, a few miles broad, to run inshore between cape Valiente and Chagres. Consequently, a small handy vessel missing the lagoon, instead of retracing her route to the northward, may, with this assistance, be able to work back again.

The coast.—From the Changuené river, the low, dark, sandy shore continues NW. ½ W., 15 miles, to Carreta point. About 7 miles from the river is the entrance of the Sics or Banana river, which has 2 feet water on the bar in the dry season, but it is navigable only a short distance. About 3 miles farther on is a small stream named Goddocon, which, however, only forces a channel through the beach after heavy rains, and is very difficult to recognize.

Sansan lagoon.—The whole of the interior is swampy, and between the rivers Changuené and Sics there is an extensive fresh-water lagoon, deep enough for canoes, and which is said to communicate with both streams. In front of the lagoon there is an excellent fishing bank, and the fishermen, when driven from it by bad weather, beach their canoes, and haul them over into the lagoon. This part of the coast is quite clear, and regular soundings extend from 3 to 5 miles, but there is no safe anchorage, except with land winds.

Carreta point is a conspicuous broad headland of white cliffs; immediately behind it there is a ridge of irregular hills, separated from the lower forks of the Cordillera, which here approach within about 10 miles of the shore, and rise to the height of nearly 3,000 feet. Close off the northeast side of the bluff there is a remarkable small rock, 90 feet high, through which the waves have bored a large hole. From the western extremity of the headland, called Manchineel point, a reef extends a short distance, affording shelter under its lee for canoes. When close to the shore, a hut will be seen on the beach, on the east side, which points out the landing place, where there is a well of good water.

Grape point.—The sandy bay on the west side of Carreta point is about 2 miles in length, and terminates at Grape point, which is low and rocky. From thence the shore trends westerly, 3½ miles, forming a slight curve, to another low, rocky point, upon which there is a remarkable isolated hill, rising abruptly from the sea to the height of 715 feet. Close off it is Pipplee cay, a small, low, rocky islet, from whence foul ground extends a mile, upon which there are 3½ fathoms, coral bottom, about 2 miles from the edge of soundings.

Hone creek.—From Grape hill, the low, sandy shore trends NW. by N., 6 miles, to Coaïta point, and is all along clear. About 2 miles from

the former, at the base of the Negro hills, is the entrance to Hone creek. This stream is difficult of access, except under very favorable circumstances, but it is navigable for small canoes as far as the lower settlements of the Blanco Indians, who carry on a small traffic in sarsaparilla, with a trading post at Coaïta point. Two days' journey up, coal has been found, and of so good a quality as to have induced the settlers at Boca del Toro to attempt to open a communication with it through the swamps and Sansan lagoon; but the obstructions were too formidable.

Coaïta point is a low, narrow, rocky neck of land, projecting about a mile to the northeastward, and on its eastern side will be seen the house of the trader, which is a conspicuous object; near it there is good water. The extremity of the point is skirted by a reef which always breaks; it extends from the east side about ¾ of a mile, and under the south side of it there is shelter for a coaster. The land in the interior becomes considerably elevated, being the lower chain of the Cordillera, and only 6 miles from Coaïta point reaches a height of upwards of 1,100 feet.

The coast.—From Coaïta point, the shore trends NW. ½ N., about 20 miles, to Lime point, and is all along bounded by the usual dark sandy beach, with deep regular soundings close up to it, the edge of the bank lying about 7 miles distant. The coast is backed, at only a short distance, by the lower irregular forks of the Matina mountains, from which descend several small streams, which force themselves through the beach after heavy rains, but they are of no importance to traffic.

Blanca point.—Lime point, on which the town of Limon stands, forms the southeastern extremity of a bold rocky promontory of white cliffs, about 400 feet high, named from its appearance Blanca point.

Port Limon.—The site of Limon was a forest in 1872, and the town dates its rise from the commencement of the Costa Rica railway in 1873. The ground has been raised from its original level to form a better foundation for the houses. The port is considered comparatively healthy, the intermittent fever not being so dangerous nor lasting in its effects as the "Chagres fever," which is not experienced here. The productions of this district are rubber, sarsaparilla, turtle shell, cedar wood, and coffee. The imports are chiefly provisions. The trade is carried on chiefly by American schooners. The population in 1882 amounted to about 2,000. There is a railway from port Limon to Rio Lucio, a distance of about 70 miles, thence a good cart road to San Jose (25 miles.)

Grape cay, situated 1,200 yards east of Lime point, is 50 feet high, 400 yards long, north and south, and 250 yards broad. The soil of Grape cay is a rich black mold, and almost every species of tropical fruit and vegetables, with several large trees, comprise its indigenous growth. Fish abound off its rocky ledges, and several kinds of shell fish are found on its shores.

Light.—On the highest part of Grape cay stands a light-house of open framework, from which, at an elevation of 60 feet, is exhibited a *fixed white* light, visible in clear weather from a distance of 6 to 8 miles. The light-house is said to be hidden by trees on some bearings.

Anchorage will be found in 6½ to 7 fathoms, good holding ground, about ¾ of a mile SE. of Lime point. This anchorage is sheltered from the prevailing NE. wind by Grape cay.

Little Salt creek flows into the bay to the southward of Lime point, from whence a path leads across to Salt creek village, and to a well of good water.

Salt creek.—The Blanca headland is about 3 miles in length, from east to west, and the shore is clear, the edge of soundings lying about 3 miles distant. On the west side a bay is formed about a mile deep; at the head of it is Salt creek, the entrance to which lies opposite a small islet, named Pumpkin cay, and is readily recognized by the village on either side. The stream is navigable for large canoes for a considerable distance, to a point from whence a mule road leads to Cartago, the journey requiring 4 days. The exports consist chiefly of indigo, cacao, sarsaparilla, turtle-shell, and a small quantity of specie, which employ a few small American and European vessels.

Anchorage.—The most convenient anchorage lies about ½ mile from the entrance of the creek, in 3½ or 4 fathoms water; it is, however, extremely dangerous, for the current runs into the bight and against the headland with a force of 2 to 3 knots, and a heavy ground swell rolls in upon the whole shore.

Directions for Port Limon.—Extreme caution must be observed in approaching this anchorage, and it should be done well to the northward; there is very little space for anchoring, and no trusting to anchors, and, should the wind fail, a vessel will be swept past very rapidly, and find much difficulty and delay in getting to the westward again. Equal care is required when leaving, which ought not to be done without a good commanding land wind, to prevent being drifted on the bluff or Grape cay.

Cordillera of Salamanca or Chiriqui.—The Cordillera of Veragua so overlaps that of Chiriqui, on the meridian of cape Valiente, that the valley which separates them is not easily distinguished, except when seen from the interior of the Chiriqui lagoon.

The highest ridge of the Cordillera of Salamanca lies nearly parallel to the shore, at the distance of about 30 miles, to abreast Blanco point, a length of 130 miles, when it takes a westerly direction, separating the lake of Nicaragua from the Pacific. From the summit of the eastern part of the ridge rise two most remarkable peaks, which, however, are seldom visible, except at break of day, or near sunset, or on the cessa-

tion of very heavy rains, when the atmosphere becomes suddenly clear and brilliant, with a change of wind from the land.

Mount Chiriqui.—Chiriqui peak, or the Volcan, which is the easternmost, bears SW. by W. ¼ W. from cape Valiente, and S. by W. ¾ W. from the Boca del Drago, and attains an elevation of 11,265 feet. When seen from the northward and northwestward, its summit has a round massive appearance, with irregular heights on either side; but from an easterly direction its peak and hollow crater are clearly defined and most remarkable.

Blanco peak rises about 40 miles to the northwestward of the Chiriqui, nearly on the meridian of Salt creek, and to the height of 11,740 feet. From all points it has the appearance of a rounded peak, the hollow of the crater being scarcely traceable, and the summit of the Cordillera is flat and table-formed for some distance on either side.

Mount Cartago.—Cartago peak, the only remarkable elevation on the western arm visible from this side of the isthmus, lies about 60 miles northwestward from the Blanco, S. ½ W., 54 miles, from Greytown, and W., 40 miles, from Salt creek. From a northerly direction the summit of this immense mountain appears of a slightly rounded form, from whence it gradually slopes to the westward into the plain beneath; but its eastern face rises almost perpendicularly to the height of 11,100 feet, and from this direction the crater is hidden. When seen, however, from the eastward, the peak and crater are clearly defined, the hollow of the crater on the northern edge. The mountain appears to rise immediately from the long flat plain at its base, and, differing in this respect from the others, is more remarkable.

On the secondary ridge there are also several conspicuous heights, and, being more frequently unclouded, are more useful objects from the offing. The easternmost are two volcanic peaks, which rise from a flat ridge under the east side of the Chiriqui mountain, about 13 miles from the southwest side of the lagoon. They are about 8 miles apart, and rise in the shape of pyramids to distinct sharp points, 7,452 and 7,017 feet above the sea.

Robalo peak is nearly on the meridian of Carreta point, and nearly midway between Chiriqui and Blanco peaks. The summit of this isolated mountain presents a large rounded form, 7,012 feet high.

Matina mountains are a group of irregular heights, from 5,000 to 7,500 feet high, one of which rises from the east end of the range in the shape of a sugar loaf, at about 14 miles, S. by W. ½ W., from Salt creek. It is somewhat remarkable how nearly the three highest peaks coincide in elevation, as well as those most conspicuous on the secondary ridge. They are all well-established geographical points, and may be safely used as points for departure or lines of direction.

The coast from Salt creek is low and densely wooded, the tops of the trees being from 100 to 150 feet above the sea, and is bounded by a dark sandy beach. It trends nearly straight, NW. ½ N., for 35 miles, thence N. by W. ½ W. for 32 miles, to Arenas point, at the entrance of Greytown harbor, and through it several streams enter the sea.

Matina river, the first of these streams, empties 10 miles from Salt creek, and is navigable for small canoes to a considerable distance; it is, however, extremely difficult to enter, and only used by the fishermen to obtain water and vegetables, bananas and plantains growing naturally in abundance on its banks, not far in the interior. It is said to have its source more than 80 miles inland, and is joined, about 30 miles from its mouth, by a tributary stream, from whence, for 25 miles, there is a road to a landing place on Salt creek, about 12 miles from the mouth of the latter.

Swarree landing.—About 9 miles from the Matina river, the beach projects a little, and, being steep-to, forms a landing place for fishing canoes. There is usually a hut here, which serves to point out the place.

Parasmina river.—About 10 miles from Swarree is the entrance of the Parasmina, which is pointed out by two or three huts. This stream is navigable for canoes to a still greater distance than the Matina, but, like the latter, it is only visited by fishermen in want of water and vegetables, which are obtained after a day's paddling.

Parasmina hills.—About 7 miles from the above river, and 4 or 5 miles inland, there is a narrow ridge of irregular hills, 5 miles in extent, from south to north, and 1,160 feet above the sea at the highest part. They are, however, so continually shrouded by the dense vapors arising from the swamps at their base, as to be seldom of use as guides.

Tortuga river, about 15 miles from the Parasmina river, is pointed out by one or two huts at the entrance, but it is of no magnitude, and only resorted to by fishermen in a case of necessity.

Turtle Bogue hill.—About 1 mile to the northward of Tortuga, close to the beach, there rises a little isolated hill, which, when seen from the northeastward, resembles a wedge with the thick end to the eastward, where it is 450 feet high. From the east and southeast it appears a rounded lump, as broad as it is high, rising almost perpendicularly on its south side, but sloping gradually to the northward, and terminating at one or two little hillocks. This is the most remarkable object on the coast, and a most useful guide to those looking for Greytown from the southward; it is distant 22 miles from Greytown.

Colorado river, the southernmost outlet of the San Juan de Nicaragua, empties about 13 miles northward of the Tortuga river. This arm branches off to the eastward from the main stream, about 17 miles from

the entrance, and it is said to be deep and rapid; the bar has 8 feet water at times, but it breaks so heavily as to be dangerous to boats, except under favorable circumstances. The mud thrown out of the river discolors the sea to a considerable distance, even in the dry season.

The Taura branch, another outlet of the San Juan, enters the sea about 9 miles farther to the northward. This arm is very shallow, but rapid; it has about 2 feet water on the bar, and is equally dangerous to navigate. From thence the northern end of the delta of the San Juan sweeps round to the northwestward, for about 3½ miles, terminating at Arenas point, at the entrance of Greytown harbor.

Morris bank lies about 9½ miles to the eastward of the northern part of the Delta of San Juan; it is between 4 and 5 miles in length, north and south, and carries from 9¾ to 12 fathoms of water, over soft mud.

Directions.—The whole of the above coast, from Salt creek to Arenas point, a distance of 65 miles, is most inhospitable, and requires to be navigated very cautiously. It is all along steep-to; in most parts there are 3 fathoms only ½ mile off-shore, from whence the depth gradually increases until soundings are lost, from 6 to 7 miles distant; the bottom everywhere being light olive colored mud. At all times a heavy swell rolls in from the NE., and breaks upon the beach with great violence.

The current sweeps along the shore to the SE. with great strength, increasing from 1 to even 3 knots as it approaches the bight of Salt creek, and at the same time inclines more towards the land. No vessel should, therefore, run the risk of anchoring anywhere, except with the land wind, and, in this case, to be sure to weigh and obtain a wide offing before the sea breeze sets in.

Turtle fishing.—From April until August, this part of the coast abounds in turtle, especially the hawk's bill species, which yields the shell of commerce, and at this period it is visited by numbers of fishing canoes. It is stated that the shore at this time is also visited by many jaguars, and that they attack the turtle when depositing their eggs on the beach, frequently succeeding in bringing others to the shore; they suck the blood, and generally leave the carcass untouched.

When forced from the ground in heavy weather, the fishermen are frequently obliged to beach their boats; and, by hauling them over, find their way into the main branch of the San Juan, through the lagoons which lie at the back of the shore.

Greytown harbor, at the northwestern or principal entrance to the river San Juan de Nicaragua, lies within a low sandy peninsula, and is about ¾ of a mile in extent. In such a position, exposed to the varying effects of so large a stream, frequent changes naturally take place, and not only is the depth of the harbor decreasing, but point Arenas,

the west end of the peninsula, has of late years so rapidly advanced to the westward as to close the harbor, except to small vessels. The north side of the peninsula is bordered with shoals to the distance of about ¼ of a mile, on which the sea breaks heavily. The channel between Arenas point and the coast has narrowed to 30 feet, with but 5 feet water, and is, at times, completely closed. Boats should not cross the bar without local knowledge.

Greytown is situated on the main, and there are a few buildings and a flagstaff on the peninsula, but the town is hidden by trees, and the land is of so uniform an appearance for some distance on either side, that the place is difficult to make out from the eastward until within a short distance.

Tides.—The tide rises and falls from 9 to 20 inches; and, during the rainy season, the river rises 2 feet above high tide.

Supplies.—The water is fresh at the entrance of the river, but it will be better to obtain it from the wells in the town. Vegetables can generally be procured, but other supplies are extremely uncertain. The seine can be hauled with advantage, but alligators and snags are apt to damage the net. Jew fish and manatee, of enormous size, are sometimes caught.

Directions for making Greytown harbor.—The current southward of the port is always running strong, but to the northward its strength is generally much reduced, being sometimes checked altogether. Nevertheless it will at all times be easier to find the harbor, by making the land well to the northward, especially in the season of Northers, which generally bring down with them a southerly current. About 30 miles northwestward of Arenas point, and 12 miles inland, there is a remarkable saddle-shaped mountain, 2,673 feet high; and close to the shore, 18 miles from the same point, there is an isolated, round, double hill, 619 feet high, which at first sight makes like an island. Both these objects are good guides. From this direction, the town will be more conspicuous, and, with the low-wooded land projecting to the eastward, will readily point out the locality of the harbor.

By reference to the chart, it will also be seen that the soundings will at once show whether the vessel is to the northward or southward of the port. Abreast Arenas point, and to the southward of it, there are 30 fathoms only 5 miles from the land, whereas from 10 to 20 miles northward of that point, the same depth will be found at the distance of 10 to 16 miles, so that in thick weather, or in the night, should the position be doubtful, a vessel may anchor or navigate safely by the lead.

In the season of the breezes and Northers, the farther a vessel lies to the eastward of Greytown the better, as a heavy swell rolls into the entrance, which, with the current running out, makes the riding very uneasy.

River San Juan de Nicaragua—This river is the channel by which the waters of the lake of Nicaragua are conveyed to the Atlantic. The surface of the lake, during the wet season, is about 108 feet above mean high water at Greytown. Fort San Carlos, at the entrance of the lake, lies W. ¾ N., 65 miles, from Greytown, but the length of the river, with its sinuosities, is 111 miles. Its breadth, in the dry season, is from 100 to 200 yards; but in the wet months, from the Juanillo to the sea, and from the rapids to the lake, it is considerably increased by the overflowing of its banks. It enters the harbor of Greytown by several small mouths, but the main navigable channel is at the southeast corner, between the coast and the adjacent peninsula.

About 4½ miles from the mouth, the Tauro arm branches off to the sea. For about 6 miles above the Tauro, the bed of the main stream runs nearly straight in a southerly direction, when it forms a sharp turn, and takes its general westerly course. About 2 miles below the elbow are the Cañon and Carlos islands, and upon the former there is a landing place, in the dry season.

About 6 miles above the bend, another much larger, deeper, and more rapid branch, named the Colorado, threads its way to the sea, and, with the Tauro, carries off so large a portion of the main stream that it has not sufficient power to convey to the sea the débris thrown into the lower part, which is, consequently, becoming much shallower. Between the Tauro and the Colorado, the river is studded with numerous islets.

About 5 miles above the Colorado, another branch, named the Juanillo, takes its course to the northward, and becomes almost lost in the lakes and swamps at the back of Greytown. Just above the Colorado is Leafs island. Near the mouth of the Juanillo are the Culebras islands, and 2½ miles above are Los Guellas islands, one of which is more than a mile in length.

Eight miles above the Juanillo, the river Serapiqui enters the San Juan from the southward. This river is about 200 yards wide at its mouth, and is said to be navigable for canoes for a distance of 30 miles. About ½ mile below the mouth of the Serapiqui is a dry sand bank, which affords a convenient landing place, and 1½ miles lower down is Paraiso island.

About 8 miles above the Serapiqui, the river San Francisco empties from the northward. Midway between the Serapiqui and San Francisco is Bedy island, and 1½ miles above the latter is another island, while still a third lies immediately below the mouth of the San Francisco.

The San Carlos river empties from the south or right bank, about 51 miles from Greytown, and 22 miles above the Serapiqui. Its entrance is about 200 yards wide, and its velocity is said to be equal to that of the San Juan de Nicaragua. Between the San Carlos and the San Francisco are numerous islands.

Between the San Carlos and the Machuca rapids, a distance of about

16 miles, the river is about 150 yards wide; it becomes deeper, and the stream is by no means so strong. The banks are from 10 to 40 feet high, precipitous, and less encumbered with decaying vegetable matter.

About 2 miles above the San Carlos, the mountain of that name rises, at only a short distance from the south or right bank, to the height of about 2,000 feet.

A little farther on, the river takes a sudden turn to the northward for about 4 miles, and then resumes its general westerly course. At the bottom of the curve, the hills near the north or left bank are about 300 feet high, and the banks of the river from 20 to 30 feet above the bed. About 6½ miles below the Machuca rapids, the small river La Cruz del Norte empties from the northward, and just below the rapids is the river Machuca.

The Machuca rapids are about 65 miles from Greytown; the fall is about 9½ feet, and the channel so tortuous and rocky, that it is difficult to navigate; just below the rapids is a small island.

The Balas rapids are about 3½ miles above the Machuca rapids, and about 1 mile farther up are the Mico rapids; just above the latter the small river Bartolo empties from the eastward.

The Castillo rapids are about 5 miles above Mico rapids, and 77 miles from Greytown; at these rapids there is a fall of $4\frac{3}{8}$ feet in a distance of $\frac{4}{5}$ of a mile, and from the foot of these to the head of Mico rapids, $5\frac{1}{10}$ feet in $5\frac{7}{10}$ miles. At Castillo rapids there is a custom-house and a village of bamboo huts, named Castillo Viejo, taking its name from the old fortress which overlooks the bend in which the rapids are. A short distance below the rapids is Juan island.

The Toro rapids are about 9 miles above Castillo rapids, and between them the banks are low, in some places nearly level with the bed, and affording no landing. Several small streams empty into the river in this space. At the Toro rapids, the river descends $7\frac{4}{10}$ feet in a distance of $2\frac{6}{10}$ miles.

Savalos river empties from the northward only a short distance above the Toro rapids. Beyond this the river is clear of rocks, and becomes very feeble; the banks are all along low, the trees in many places rising out of the water; and the depth is about 12 feet.

About 6 miles above the Savalos is Chica island, and 1½ miles farther on, Grande island; abreast the latter there is a ridge of hills, about 800 feet high, not far from the north bank. About 6 miles above Grande island is another island, ½ mile in length, and 1½ miles beyond this, the bed of the river makes a sharp bend, running about WSW., for 3½ miles, to Isla Longa, and thence westerly, 4½ miles, to Lake Nicaragua. In the last reach there are four small islands.

The old fort of San Carlos stands on the north side of the river, a

short distance from the point where it leaves the lake, upon a mound about 100 feet in height. At the base of the mound there are a few huts.

Navigation of the San Juan de Nicaragua.—The ascent of the river to lake Nicaragua is made by means of light draught steamers, and bongos, the latter being broad-bottomed boats of from 4 to 5 tons burden. The highest stage of water is usually in October, and the lowest in May; the difference in level, at the head of the river, being about 6½ feet. As high up as the mouth of the San Carlos, the river has become silted up with débris from the Serapiqui and San Carlos, to such an extent as to render navigation, below the San Carlos, difficult under the most favorable circumstances.*

Between the mouth of the San Carlos and the foot of the Machuca rapids, a reach known as the Agua Muerte, the river is deep, with very little current.

The Machuca, Balas, and Mico rapids follow each other in such quick succession that the reaches are short, and much broken; but between the Mico and Castillo rapids, a stretch of 5 miles, the river is comparatively free of dangers. Great difficulty is experienced in running the rapids during the low stage of water, and at that time the Castillo rapids are impassable. When this occurs, cargo is transferred from one steamer to another, around the rapids. In 1873 this transfer was made by means of a tramway, connecting the landing below the rapids with the one above.

Between the Castillo and Toro rapids, a distance of about 9 miles, the river is comparatively deep, and clear of obstructions; and between the Toro rapids and lake Nicaragua, a distance of about 25 miles, the channel is clear, and has an average depth of about 13 feet.

The coast from Greytown trends, with only a slight curve, about NNW., 30 miles, and is all along low and woody, and bounded by a dark sandy beach, upon which there is always a heavy surf. About 5 miles from Greytown is Indian river, and 12 miles farther on is Spanish creek, neither of which is of any importance. About 4 miles inland, between these two streams, a ridge of wooded hills, 520 feet high, extends parallel with the shore, and 2 miles to the northward of Spanish creek is the remarkable isolated round hill previously mentioned.

Corn river empties about 5 miles to the northward of the above round hill; canoes navigate this small stream, but the bar breaks so heavily, with the least swell, that it is seldom accessible.

The sandy beach terminates at a bold, rocky point, 6 miles to the north-

*In 1873, at the commencement of the dry season, a steamer, drawing only 18 inches, had difficulty in navigating this part of the river. At a good stage of water, the regular steamers were then running from Greytown to the foot of the Castillo rapids, but as the dry season advanced, these steamers were unable to navigate the San Juan below the forks of the Colorado, and soon after, were unable to go above the Machuca rapids. A small flat-bottomed steamer was then brought into requisition for navigating the rapids.

ward of Corn river, and from thence the coast bends round to the northeastward, for about 6 miles, to Gorda point, and becomes considerably elevated. This space is formed of small sandy bays separated by rocky bluffs, close off which are several small wooded islets, from 30 to 100 feet high, steep-to. In the bight west of Gorda point, there is shelter in from 2 to 3 fathoms water. White rock lies a little more than 1½ miles SW. by W. of Gorda point.

Water.—At the bottom of the bight, to the westward of Gorda point, about 1⅝ miles, there is a small stream of good water.

From Gorda point, the coast trends about NE. by N., for 12 miles, to Monkey point, and presents similar features, but the beaches are longer. About 4½ miles to the northward of Gorda point is the entrance of the Rama river. which has 5 feet water on the bar, but it generally breaks. This river is reported to be upwards of 80 miles in length, and is navigable to a considerable distance by the canoes of the Rama Indians, whose settlements reach far in the interior; there is a small village just within the mouth on the right bank.

The Rama Indians are said to be not very numerous. They are considered mild, inoffensive, and faithful, and most expert in the management of their canoes, which are better formed for landing in a heavy surf than those of the Mosquito men.

Baxaro Bovo, the largest of the islands off this part of the coast, lies E. ½ S., 4 miles, from the mouth of the Rama; it is thickly wooded, 155 feet high, steep-to, and between it and the main the depths are from 6 to 3 fathoms. When seen from the eastward, it has the appearance of a small, green, conical hill, but from the southward, it forms like a wedge, with the thin end to the eastward.

Monkey point is the southern of three remarkable headlands, which together form a bold rocky promontory, 2 miles broad, at the base of the Saddle mountains. The northernmost of these headlands is a black bluff, 90 feet high, from whence red cliffs extend in a northwest direction, nearly a mile. The center one forms a red, conical hill, about 100 feet high; and the southernmost is rocky, but somewhat lower than the other two. At ½ mile, about E. by S., from the middle bluff, there is a small woody cay, about 60 feet high at its northwest end, from whence it slopes down like a wedge; it is steep-to all round, and there are 4 fathoms between it and the main. Between the middle and northern headlands, the coast is foul to the distance of ½ mile. About ¾ of a mile, S. by E. of Monkey point, there are two small islets, called Kansas cays, with 3 fathoms water inside them.

Monkey point harbor, an open bay, extends about 2 miles northwestward from Monkey point, and affords shelter for very small vessels from winds from E., around by north to SW., in from 8 to 10 feet of water, about ¼ of a mile from shore, with Rocky cay, at the south-

west extremity of the harbor, bearing SW. by W. ½ W. The soundings are regular inside Kansas cays, and vessels drawing 15 feet or less, may take up a berth by a careful use of the lead. The deepest water is on the northeast side.

Water.—At the bottom of the harbor a small stream empties, from which good water may be obtained.

Matina bight.—The shore between Greytown and Monkey point is generally known to the coasters as Matina bight, which, with the exception of the little islets above described, is everywhere steep, clear, and safely navigable by the lead. Abreast the round hill, the edge of soundings is about 17 miles distant; from thence it takes a northeasterly direction, and, on the parallel of Monkey point, is 28 miles off. The depths are regular, gradually decreasing towards the shore, upon a muddy bottom, with the exception of a small knoll lying about 5 miles from the edge, and NE. ½ N., 8 miles, from Arenas point, where the depth suddenly changes from 30 to 14 fathoms, and again deepens inside to 22 fathoms, which may be a useful guide in the night, or thick weather.

Anchorage.—In moderate weather, vessels of too large a draught to enter Greytown harbor, may anchor anywhere, as most convenient; but in Northers, or strong NE. winds, so heavy a short, topping sea rolls in, that it will be better to remain under sail, or proceed to either Great Corn island, or to an anchorage under Pearl cay point.

The coast from Black bluff trends N. by W., 23 miles, to the entrance of Blewfield lagoon, and is all along very low and swampy, the tops of the trees being from 40 to 60 feet above the sea; about 10 miles to the northward of the bluff, however, is a small ridge of low red cliffs. At 5 miles farther on there is a shallow opening, a mile wide, through which canoes pass into the Blewfield lagoon, although the bar generally breaks heavily. For a distance of about 6 miles from Black bluff, the coast is clear and bold, but from thence to Blewfield bluff, it is skirted by cays and reefs, which are extremely dangerous.

French cay, the southern and outermost of these islets, lies N. by E. ½ E., 7½ miles, from Black bluff, and 4 miles from the main, and is very small and woody, with a flat summit about 90 feet high. It is bold on its north and east sides, but a reef runs off ¾ of a mile to the southwestward, between which and the coast the soundings are from 7 to 9 fathoms.

Sister cays are two small islets lying 9 miles from the bluff, and only ¾ of a mile from the beach, near the red cliffs; but there is a dangerous breaker 1½ miles to the eastward of them.

Pigeon cays lie about 2 miles farther to the northward, and about 1½ miles to the eastward of a remarkable green point. The largest is

about ¼ of a mile in extent; its saddle-shaped summit is 110 feet high, and at its base there is a well of good water. A small detached breaker lies about a mile to the eastward of this cay; and ½ mile to the northward there is a remarkable white rock, 50 feet high, crowned with trees.

Guano cay, lying about 4 miles to the northward of the above white rock, and NE., 2½ miles, from the opening into the Blewfield lagoon, is small, and about 40 feet high, with sides of red cliffs covered with vegetation; the space in-shore and to the southward is full of dangers. North, 2½ miles, from the cay, there is also a very dangerous breaker; and another 2½ miles farther on, in the same direction, with 8 feet water, which bears S. ½ E., 2½ miles, from Blewfield bluff.

Blewfield lagoon is of considerable extent, but so cut up in the southern part by mangrove islands, that its dimensions are extremely variable; and this portion of it is called by the settlers Horn e sound. The eastern side of the lagoon is bounded by Deer island, which is about 8 miles long, north and south, terminating at the southern end at the shallow opening already described. The east side of the northern entrance is formed by Blewfield bluff, a remarkable bold promontory, a little more than ½ mile in extent, 118 feet high, formerly thickly wooded, but now less so, from the effects of a hurricane in October, 1865. It stands prominent from the adjacent low swampy lands; and has, from a wide offing, the appearance of an island, and, consequently, at once points out the locality of the lagoon. On the eastern side of the bluff are low cliffs of red indurated clay, having 3 fathoms water from 200 to 300 yards off, and 5 fathoms at the distance of about 600 yards.

The mouth of this entrance, between the north end of Deer island and the bluff, is ¾ of a mile wide, but in the middle there is a small low wooded cay, named Casava, with a house upon it, leaving a navigable channel between it and the promontory, from 200 to 400 yards wide. On the bar, which extends across from the southwestern extremity of the bluff, in a SW. direction, towards the main, there are only from 10 to 13 feet water, according to the state of the rivers which flow into the lagoon; but inside the depth gradually increases to as much as 30 feet off the northwest end of the promontory.

The whole of the southern part of the interior is filled with shallow oyster banks, between which are canoe channels, very difficult, however, for a stranger to trace out. One of them, deep enough for a light boat, leads up to a Moravian missionary settlement, healthily situated on a high bank under a high hill on the main, 2½ miles to the westward of Deer point, and a little to the southward of the entrance of the Escondido. In 1868 it contained about 800 inhabitants, half of whom spoke English; the rest are Indians; the numbers, however, fluctuate considerably, for the Indian with his family lives more frequently in a canoe than on shore, and only returns to his hut for the purpose of bar-

tering sarsaparilla, gums, vegetables, fish, and turtle shell, obtained from the cays and banks of the rivers; schools for the native children have been established.

Blewfield river.—The largest stream that enters the lagoon is the Blewfield, or Escondido river, which empties at its northwest end, and is navigable for small craft, drawing 10 feet, for a considerable distance, and for large canoes, three or four days journey, to the settlements of the Wulwa or Crooka Indians. This stream takes its course along the north side of the lagoon, and close under the west side of the promontory, and, when full, runs out through the entrance at the rate of 1½ to 2 knots; but when low, the flood overcomes it, and runs in to a short distance, for about three hours, at the rate of 1½ knots an hour.

There is a well of good water in the southern sandy bay on the west side of Blewfield bluff, and the land around it is cultivated by the settlers at the bank, but supplies are uncertain.

Blewfield, situated at the mouth of Blewfield river, is the residence of the King of Mosquitia. The inhabitants of the Mosquito coast consist of the Wuleva, Rama, Smu, and Carib tribes.

Directions for Blewfield lagoon.—On the parallel of Blewfield bluff, the edge of the Mosquito bank lies 43 miles from the land, and between this parallel and that of Monkey point, the soundings are extremely irregular, and, in places, very alarming; for, by reference to the chart, it will be seen that the depth will suddenly decrease from 20 to 10 fathoms, and to even as little as 5 from 17 fathoms. The largest of these patches is about 3½ miles in extent, and lies E. ½ N., about 12 miles, from French cay, and has from 10 to 5 fathoms, coral bottom.

The 20 fathom line, however, is generally from 15 to 18 miles from the land; and within this the depth is more regular, decreasing to 11 and 12 fathoms, close up to the cays and reefs, over a bottom of grey sand shells, and coral. As already stated, the coast to the northward of French cay is extremely dangerous, and must be approached with the utmost caution, for the soundings afford but little warning. In approaching from the northward, or from Great Corn island, the south end of which bears ENE. ½ E., 37 miles from the bluff, the soundings will be found far more regular, and everywhere under 20 fathoms, over fine sand, with a few patches of coral.

The nearest anchorage to the entrance of the lagoon, for vessels of large draught, should be with the eastern extremity of the bluff bearing N. by W. ½ W., distant 1½ miles, and Casava cay just open of the southwest end of the promontory, NW. ½ W., in 5 fathoms. It is, however, completely exposed to the usual wind, and, when it blows fresh from the NE., a high swell rolls in and breaks heavily on the bar.

Vessels of 10 feet draught, intending to enter the lagoon, had better sound and buoy the bar previously; for not only the depth, but the line

of deepest water, varies with the change of weather and state of the Escondido. The best berth for small craft is close under the northwest end of the promontory.

Tides.—It is high water, full and change, in Blewfield lagoon at 1h. 50m.; springs rise about 2 feet, and neaps 16 inches; but the tide generally rises 6 inches higher in the night than in the daytime. In the dry season the flood runs 3 hours and the ebb 9 hours, but in the rainy months the latter runs continuously.

False Blewfield.—From Blewfield bluff, a sandy shore trends N. ½ E., 21 miles, to the entrance of Pearl cay lagoon; it is everywhere low and swampy, except at 10½ miles to the northward of the bluff, where, upon a slightly projecting point of low, red cliffs, there is a little green mound, about 60 feet high, named False Blewfield, from its having, at a distance, somewhat the appearance of the bluff.

Cayman rock.—About 6 miles to the northward of Blewfield bluff, and 2 miles from the main, there is a small barren rock, 25 feet high, with 6 and 7 fathoms close around, and a clear channel inside, with 6 to 3 fathoms. Elsewhere the coast is clear, with 5 to 6 fathoms at the distance of about 1½ miles.

The Cookra hill, 587 feet high, is the most remarkable object on this part of the coast. It is completely isolated, and rises 6 miles inland, N. by W. ¾ W., 16½ miles, from Blewfield bluff, and W. ½ N. from Quin's house, at the south end of Great Corn island, from whence it is visible, under favorable circumstances, although 42 miles distant. There is also a hill of similar appearance, 483 feet high, about 14 miles southward of the Cookra, at the back of Blewfield lagoon, but it is not so often in sight, and therefore not so useful a landmark.

Pearl Cay lagoon, although of great extent, is so cut up by mangrove islands, that it is quite impossible to give its dimensions. It is said to be from 20 to 30 miles in extent, north and south, to reach within 8 miles of the Rio Grande, and, in the rainy season, to communicate with Blewfield lagoon. There are several small settlements, or trading posts, on the western shore, the largest of which, named English bank, is situated about 4 miles southwestward of the entrance; another lies about 4 miles farther to the westward, and there is one at the northern extremity, about 20 miles distant, named Old bank. They are inhabited by Indians, and a few traders; at English bank there are about 40 huts. Several rivers and considerable streams empty into the lagoon, the principal of which, named the Wawashan, enters at the northwest end, about 25 miles from the entrance.

The mouth of the lagoon is about ½ mile wide, but a short distance within, it is contracted to not more than 400 yards, and in this narrow part there is a depth of from 3 to 5 fathoms. A bar of sand extends across from SE. to NW., at the distance of about ½ a mile from the en-

trance, leaving a small channel of 8 feet water at the former end, and a passage for canoes at the other. These openings, however, shift both in direction and depth, and the bar breaks heavily right across, except in fine weather, when the southeast channel is pointed out by the smoothness of the water. The interior of the lagoon is filled with shallow oyster banks, between which are intricate boat channels, leading up to the settlements, but the channels are extremely difficult to find. Just within the north point, the shore is sandy and very steep, and is generally strewed with alligators, which abound in this lagoon.

Tides.—It is high water, full and change, in Pearl Cay lagoon at 2h; springs rise about 2 feet.

Anchorage.—From the entrance of the Pearl Cay lagoon, the coast curves round to the eastward, forming a slight bay, about 8 miles in extent, which terminates at Parati, or Pearl Cay point. There is good, and tolerably smooth anchorage, all along, in whatever depth most convenient. The soundings decrease gradually towards the shore, on muddy bottom, and the 3 fathom line is from 1½ to 2 miles distant.

Pearl Cay point, when seen from the southward, forms a prominent projection. It is bounded by a white sandy beach, which forms the shore all the way from the lagoon, but the trees behind it are from 90 to 110 feet high. A coral ledge extends to the eastward, about 2 miles, from the point, and ESE. ½ E., 3 miles, from the point, is the Maroon knoll, about ½ mile in extent, with 3 fathoms water on it.

Great Corn island lies SE. by E. ¾ E., 29 miles, from Pearl cay point, and the edge of soundings, east of it, is 18 miles distant. It is 2½ miles long, NNE. and SSW., and nearly 2 miles broad at its north end, from whence it tapers away to a bluff, rocky headland, ½ mile broad at its southern extremnity. A ridge of high land extends through the greater part from north to south, and at the distance of about ¾ of a mile from the north end of the island, mount Pleasant rises, rather abruptly, to a wooded peak 370 feet high; from thence it slopes more gradually to the southward, to the bluff, where it is about 100 feet above the sea, and between the base of the ridge and the western shore, there is a plain about ½ mile in breadth.

This island has no springs, and bears evident features of volcanic origin; large bowlders of porous lava being strewed about the beaches, and in several parts of the interior. A bridle road leads all around the island; and it is a most convenient spot to obtain provisions, and recruit the health of a vessel's crew.

In 1875 there were about 300 inhabitants, principally descendants of liberated Africans. The chief settler, who occupies a large portion of the extreme south end of the island, and whose house may be seen through a luxuriant grove of bread-fruit trees on the summit of the ridge, acts as principal magistrate, by permission of the king of Mosquito; but

the possession of the island is disputed by New Granada. No steps, however, have been take by the latter to govern it, and the inhabitants, being left entirely free and independent, settle whatever disputes may arise among themselves.

Nearly half the eastern shore of Great Corn island is occupied by a sandy beach, named Long bay, off which there is anchorage with NW. winds. In front of it, however, about ¾ of a mile from the shore, lies a narrow ledge, with 18 to 21 feet water, about 800 yards long from NE. to SW., the center of which bears S. by E. ¼ E. from mount Pleasant, and SSW. ¼ W. from the eastern extremity of the island; there are 8 fathoms close outside, and 5 fathoms inside, decreasing to 3 fathoms within about 200 yards of the beach.

The Northern shores of the island are chiefly formed of low shelves of rocks, and small sandy beaches, which are skirted by a coral ledge extending ¾ of a mile from the north end of the island; the ledge is steep-to, and NE. from this point of the island there is a narrow, intricate cut, which admits coasters into shelter in Sandy Fly bay.

The above ledge terminates at the northwest end of the island, about 400 yards from the shore, at the north end of Brig bay. This bay is about ½ mile in extent and quite clear, deep, and bold, but so exposed to the northeast roll as to afford no shelter.

The south end of Brig bay terminates at the western extremity of the island, between which and Quin bluff, the shore forms Southwest bay, a mile in extent, in which there is excellent anchorage with the usual winds, but not when blowing hard from the NW. From this quarter, however, it is somewhat sheltered by a coral ledge extending little more than a mile in a SW. direction from the west end of the island, and which breaks when blowing strong. A small cut separates it from the point, in which there are 18 feet water close to the latter, but elsewhere there are only from 9 to 12 feet; the outer end bears WNW. from Quin bluff, and WSW. ¼ W. from mount Pleasant, and, being steep-to, must be approached with great caution.

Supplies.—The island, being free of swamps, is considered remarkably healthy; and it is fertile, nearly all the tropical fruits and vegetables, also cotton, corn, coffee, and sugar-cane growing in the greatest perfection. There are also plenty of fowls, pigs, and cattle, and a few horses; the cattle, however, are grazed on Little Corn island. The shores are also fringed with a deep grove of cocoanut trees, which yield so abundantly that the nuts and oil form articles of export, together with turtle shell, cattle, and a small quantity of cotton.

Water is readily obtained from a well a short distance from the south end of the beach in SW. bay, and there is wood in the neighborhood; but the latter is not so plentiful, and may have to be purchased. There is no button-wood here, and the only tree fit for burning is the sea grape; it should, however, be barked and dried before it is stowed away, as a precaution against sickness.

Anchorage.—The southern extremity of the island is clear and bold, and the whole bay, between it and the ledge, is also clear, with a depth of 7 fathoms, over a sandy bottom, gradually decreasing to 3 fathoms within 400 yards of the beach. A convenient berth for vessels of large draught will be found with the west end of the island N. ½ E. and Quin bluff ESE., ½ mile distant, in 4½ fathoms.

Directions for Great Corn island.—The west side of Great Corn island must be approached with much caution; and in working into the anchorage in South West bay, from the southward, mount Pleasant must not be brought to the eastward of NE. by E., to avoid the ledge. In the winter months, should the warnings of a NW. wind make their appearance, it will be better to weigh at once; and, if necessary, take up a berth off Long bay, or remain under sail, until the wind resumes its general direction.

Blowing rock.—The only danger in the way (and this only in the night-time) in approaching Great Corn island from the southward, is a small, black, barren rock, about 10 feet high, lying S. by E. ¼ E., 7 miles, from Quin bluff, and 6 miles from the edge of soundings. Its rugged summit, at a certain distance, has the appearance of three men sitting in a boat, and it receives its name from the sea throwing itself up occasionally through a hole, like the spouting of a whale. There are 20 to 35 fathoms outside it, 30 to 15 between it and Corn island, and 10 fathoms close around it.

Little Corn island lies NNE. ½ E., 8 miles, from Great Corn island, and the edge of the bank of soundings, east of it, is 17 miles distant; the depths in that direction are regular, from 27 to 22 fathoms close up to the shore; and between the two islands, from 20 to 14 fathoms.

This island is 1½ miles long, in a NW. by N. and SE. by S. direction; the northern part is about ½ mile broad, and the southern only ¼ of a mile. The shores in most parts are fringed with cocoanut trees, and rise with a gentle slope to a plane of savanna land, about 50 feet above the sea, covered with long rich grass, affording excellent pasturage to stock belonging to the inhabitants of the neighboring island, and which are grazed here under charge of a single settler. A reef extends about ¼ of a mile from the east side of the island, and about ¾ of a mile from the north end; a coral ledge, with 2½ to 3 fathoms water on it, extends ¼ of a mile from Gun point, the western extremity of the island.

Anchorage.—Between Gun point and the south end of Little Corn island, the shore is clear and bold, and forms a slight curve, named Pelican bay, about a mile in extent, off which there is tolerable anchorage with the prevailing winds. The best shelter will be found in 6 fathoms, with the south end of the island bearing ESE. ½ E., and Gun point N. by W. ½ W.

The Pearl cays extend to the eastward about 13 miles from the land, and from south to north about 11 miles. The whole of this space is filled with small clusters of cays and reefs, of the most dangerous character, and, although there are several convenient anchorages for wooding and watering, or even for discharging and heaving down, in case of necessity, it requires the utmost caution to navigate among them. The soundings in many places show a muddy bottom, which is only a thin covering over coral; and without taking the precaution of having the buoy rope stopped to the crown of the anchor, and of sufficient strength to trip it, there will be great risk of losing it. The water is also so turbid that the shoals are not seen, except those which break on very shallow ledges, and the consequence is that small rocks are continually being discovered, especially between the westernmost group and the land.

Maroon cay, the southwesternmost of the Pearl cays, lies ENE. ½ E., 2½ miles, from Pearl Cay point, and is separated from the outer edge of the ledge by a small channel of 3 fathoms water. The cay is small, and the trees upon it are 110 feet high; its southeast side is steep-to, but from its northern side a reef, on which the sea breaks, extends ½ mile. On its western side there is a well of good water.

Columbilla cay, the southernmost of the islets, lies E., 6½ miles, from Pearl Cay point; it is about 300 yards in extent and very low, but covered with remarkable table-topped trees 110 feet high. A coral reef, steep-to, skirts it all round, and extends from the north side 300 yards. On the west side there is a clear spot for landing, and off it there is exposed anchorage in 10 or 12 fathoms at about ¼ of a mile from the cay.

Seal cay, the easternmost of the group, lies E. by N., 12½ miles, from Pearl Cay point. This cay is only a small low strip of coral and sand, covered with dwarf trees to the height of 32 feet above the sea. A coral ledge, upon which are several small dry rocks, extends nearly a mile from it in a NE. direction, and foul ground in a S. by W. direction, about the same distance from its south end; the east side is bold, and the depth is 4 fathoms at 600 yards from the west side.

This islet bears NW., 19 miles, from Great Corn island, and the same distance, W. by N. ¼ N., from Little Corn island, and the soundings between vary from 8 to 16 fathoms, clean sand and coral. Between Seal cay and the Columbilla, the depth is still more irregular, and there are many coral spots of only 5 fathoms.

Southwest group of cays, about 5 miles northeastward of Pearl cay point, is a group of small cays covering a space about 2 miles in diameter, consisting of Baboon, Crawl, Grape, Forster, Lime, Vincent, and Wild Cane cays.

Lark rock, with $1\frac{1}{2}$ fathoms water over it, lies $\frac{1}{4}$ of a mile, SE., of Baboon cay.

French and Water cays lie about 1 mile northwestward of the Southwest Group, from which they are separated by a channel of from 7 to 10 fathoms depth.

Middle group of cays, consisting of Bill-bird, Mangrove, Tungwarra, Little Tungwarra, and Button-wood cays, lies about 2 miles NE. of the Southwest Group, from which it is separated by a channel of a general depth of from 6 to 11 fathoms.

Compass reef, on which the sea breaks, lies SE. $\frac{1}{2}$ S., $2\frac{1}{3}$ miles, from Bill-bird cay.

Northeast group of cays, consisting of Northeast, Askill, and Little Askill cays, lies about 2 miles northeastward of Middle Group, with sounding between varying from 4 to 14 fathoms. Northeast cays consist of three small rocks, occupying a space about 600 yards in extent, in a SW. and NE. direction. They are steep-to on the east side, but to the westward, a broken ledge nearly connects them to Askill cay, which bears from the center one SW. by W. $\frac{1}{2}$ W., about $1\frac{3}{4}$ miles, and is 80 feet high. NW. by N., nearly a mile, from Northeast cays, there is a dangerous breaker.

Boden reef.—In a direct line between the Northeast cays and Seal cay, and 5 miles from the latter, there is a dangerous ledge, 1,200 yards long, east and west, with only 13 feet water on it, called Boden reef, which does not always break.

Wood.—Almost all the cays to the westward are covered with wood, and the trees vary in height from 50 to 100 feet. Water cay has become the residence of a British trader. Good spars will be found on some of the southwest cays, and on Lime cay, coral fit to be burnt for lime.

Water may be found on most of the Pearl cays by digging wells, but the best is on Water cay; the wells are there conveniently situated, but they should be baled out before use, as the Indians wash their clothes, and bathe in them.

A narrow vein of 6 fathoms water runs through the center of this cluster, from north to south, which is so sheltered that vessels might heave down or discharge alongside Forster cay, but it is impossible to give safe directions for entering it.

Caution.—By reference to the chart, it is evident that the space to the westward of the southwest cays is extremely dangerous, for the small shoals, named Orion, Brunswick, Leopard, and Mariner were only discovered by those vessels in 1857. In fact, as before stated, the ground is everywhere so suspicious, that, in proceeding to the northward or southward, it will be better to avoid these cays altogether, by passing between them and the Corn islands, giving the cays a wide berth.

Tides.—It is high water, full and change, at the Pearl cays at 2h. 0m.; springs rise about 2 feet.

The coast from Pearl cay point trends N., about 100 miles, nearly straight, to Brangmans bluff. It is all along bounded by a dark sandy beach, upon which the surf breaks with such violence as to render landing difficult, and often dangerous, even to well-handled canoes.

The interior is low, and cut up by many extensive swamps and lagoons, which drain into the sea; the tops of the trees are from 80 to 120 feet above the sea. Numerous streams also flow into this space; and about 17 miles to the northward of Pearl cay point, there is a haul-over, for canoes, into the north end of Pearl cay lagoon. As far up as abreast the Rio Grande, and 10 miles to the northward of it, the coast is still skirted by clusters of small cays and dangerous shoals, which render it quite inaccessible to anything larger than a trading canoe or coaster, well acquainted with the inshore navigation.

To the northward of Man-of-War cays, with the exception of the Fox reef, at the south point of the Wounta river, the shore is everywhere clear, and safely navigable by the lead; the soundings gradually decrease towards it, and there are from 4 to 6 fathoms, over very fine, white sand, within less than 2 miles of the beach.

About 24 miles northward of the Rio Grande, there is a small ridge of wooded land, 150 feet high, which, overtopping the neighboring trees, is a conspicuous object; and about 28 miles farther to the northward are several remarkable mounds, 80 feet high, and on their northern side is a low neck of land, over which canoes are hauled into the Tongula lagoon, in bad weather. At 19 miles to the northward of these mounds is Brangmans bluff.

Rio Grande, the first stream met with of any importance, reaches the sea about 30 miles from Pearl Cay point, abreast the Tyra cays. It has 6 feet water over its bar, which, being slightly sheltered by the adjacent cays, is more frequently easy of access than those situated farther to the northward. There are several Indian settlements on its banks, at only a short distance from the coast, the principal of which, and the residence of a Mosquito chief, stands on rising ground in the midst of an extensive savanna, about 8 miles from its mouth. The course of the river is unknown to the traders, but it is said to be navigated nearly 200 miles.

Great North creek forces its way through the beach, 17 miles to the northward of the Rio Grande, but it is of no importance.

King cays lie about 12 miles to the northward of the Northeast cays of the Pearl cay group, and from 8 to 12 miles from the coast. This cluster consists of four small cays, occupying a space of about 3 miles; 3½ miles to the southward of them, however, there is a dangerous rock, with only 2 feet water on it, which bears SW. ½ S. from the easternmost cay, and SE. ¾ S. from the southwest cay. The latter cay is sandy;

and between it and the main the depths are 6 to 9 fathoms, but there are several foul spots between it and the Pearl cays.

A cay of small extent lies 3 miles SW. of the northern extremity of King cays.

Tyra cays.—These three little islets lie on a coral ledge, 8 miles in extent, NE. and SW., the latter extremity being about 6 miles from the main, and there are 7 to 8 fathoms between. The Tyra rock, at the northeastern extremity of the ledge, is a small barren rock, 8 feet high, steep-to on its east side, lying N. by E. ½ E., 9½ miles, from the northernmost King cay, and E. ½ N., 13 miles, from the entrance of the Rio Grande. At 4½ miles, SW. ½ S., from this rock, is Great Tyra, which is a little larger, and covered with trees elevated 60 feet above the sea. At ¾ of a mile, S. by E. ½ E., from the Great Tyra, is the southernmost islet, named Seal cay, which is a little barren rock only 10 feet out of the water. At 1 mile, E., from this cay, there is a dangerous breaker, and shoals extend WSW., 3½ miles.

Man-of-war cays.—This cluster consists of four small, low islets, covered with trees and brushwood. The three easternmost lie close together, and form, between them, a little harbor for fishing vessels. The fourth lies a mile to the westward of these, leaving a clear space between, with 10 fathoms water. At ½ mile northward of the latter lies a small, barren rock; and NE. ½ E., 1¼ miles, from the eastern cays, there is a similar one, named Egg rock, which is 6 feet out of water and steep-to. A dangerous isolated breaker also lies SW., 1¾ miles, from the western islet, and 7 miles from the main land; the soundings are from 5 to 7 fathoms inside it.

Coral patches.—About 30 miles, ENE., from Man-of-war cays, are three small shoals of 7, 8, and 9 fathoms, respectively; and at E. by S., distant 34 miles, is a coral patch with a least depth of 7 fathoms.

Rivers.—The Walpasiksa enters the sea 30 miles to the northward of the Rio Grande, over a bar of 3 feet water, which breaks heavily. At 3½ miles farther on is the Prince Apulca, which has a dangerous bar of only 3 feet, but it is ascended by large canoes to a considerable distance. An Indian settlement is situated about 7 miles from its mouth, on the left bank, and about 10 miles higher up there is another, on the banks of a small lake, from whence a slight traffic is carried on with the Woolwas and Dongolas, for large canoes, dories, and pitpans, in exchange for cotton goods and hardware. About 5 miles northward of the Prince Apulca is the Wounta, which has a bar of 4 feet water. The entrance is about a mile wide; and abreast the south point, 1½ miles from the shore, there is a rocky ledge, 1½ miles in length, north and south, named Fox reef, which breaks, and is steep-to. Between the Wounta and Prince Apulca are some remarkable lofty palmetto trees. The Wava, which empties 21 miles northward of the Wounta, and 12½ miles

from Brangmans bluff, runs out of a large lagoon lying close to the shore, into which a considerable stream flows, that is reported to rise upwards of 150 miles in the interior. A bar of 4 feet water lies across the entrance, and, after rains, the muddy water from the lagoon discolors the sea to some distance. To the northward of the Wava lagoon is the Para lagoon, and there is a communication, for canoes, from one to the other.

Brangmans bluff is a bold headland, 150 feet high. About 2 miles southwest of it there is a remarkable ridge of red clay cliffs, ½ mile in extent, which rise to the height of 60 feet above the level of the sea.

At about 25 miles westward of the bluff, the mountains of the interior reach an elevation of 1,000 feet, but they are seldom visible. The country abounds in deer, and they frequently appear on the shore, about high-water mark, probably for salt.

Water.—Close to the south end of the above red cliffs there is a small stream of good water. The depth is 3 fathoms, within ½ mile of the beach, and 5 fathoms 2 miles distant, and the shore is all along clear and bold.

The coast from Brangmans bluff trends in a NE. direction, for 7 miles, to the river Hueson, which has a dangerous bar of only 2 feet water, and is of no importance. At 10 miles to the northward of it is Owasterra creek, pointed out by a little village of huts at the entrance.

From the river Hueson, the shore curves gradually to the northward, for 15 miles, to Gordo point, which is merely the outer part of the curve, and is only recognized by a few huts on the beach. Here it takes a N. by W. direction, almost straight, for 25 miles, when it trends N. by E. ½ E., 9 miles, to the entrance of cape Gracias harbor. At 2½ miles northward of the huts is Duckwara creek, which has a shifting bar of only 3 feet, and is but 1¾ miles in length, when it enters the Duckwara lagoon.

The north point of the entrance is sandy; and on the south point there is a clump of trees, 60 feet high. An Indian village is situated on the south bank, in the midst of a small cultivated savanna. At 5 miles farther on is Sandy Bay river. This little stream enters the sea over a bar of 4 feet water, and communicates with a small lagoon, about 2 miles from the entrance, on the shore of which there is a considerable village.

The entrance to Wano lagoon is about 20 miles from Sandy Bay river, and 7 miles to the southward of cape Gracias harbor, and, being a mile wide, is readily distinguished. This extensive lake will admit small canoes, and communicates with the Sandy river lagoon.

Throughout this long line of 56 miles, the shore offers precisely similar features to those to the southward of the red cliffs at Brangmans bluff, except that the small openings, instead of leading into rivers, serve as drains to shallow lagoons, of great extent, navigable for small canoes.

The coast is everywhere clear and bold, and there are 3 fathoms water within about 1½ miles of the beach.

Cape Gracias harbor.—Cape Gracias á Dios is the extreme northeast point of the Mosquito coast, and of the great delta of the river Wanks. The land about it is everywhere low and swampy, and the tops of the trees are about 80 feet above the sea. From Cape Gracias á Dios a low, narrow neck of land, which formerly consisted of three separate cays, sweeps around to the southwest, joining the mainland about 6 miles from the cape, and inclosing a shallow lagoon, about 4 miles in length, in a NE. and SW. direction, and with an average breadth of 1½ miles, called cape Gracias harbor. One branch of the river Wanks empties into this harbor, and the débris therefrom has had the effect of greatly lessening the depth of water. The entrance to this harbor, at the extreme southwest end, as marked on the chart, is entirely filled up, and is now dry land. There is an entrance about 3 miles southwest of cape Gracias á Dios, but it is very narrow, and a vessel drawing more than 6 feet cannot cross the bar. The bar constantly breaks, and the tide ebbs and flows across it at the rate of 2 knots per hour, spring tides more.

From the cays inclosing the harbor a flat mud bank extends gradually off to the eastward into 3 fathoms, at the distance of about a mile, when it increases to 4 and 5 fathoms, and the ground is everywhere clear, with regular soundings up to the cays in the offing.

Anchorage.—Cape Gracias harbor is now only accessible to coasters, and they must not depend upon the depth or position of the channel across the bar. There is good holding ground for large vessels a little more than 2 miles SW. of the entrance, in 4½ or 4 fathoms, muddy bottom, about 1 mile from the shore.

Tides.—It is high water, full and change, in cape Gracias harbor at 10h. 30m., and the rise is about 2 feet, but uncertain.

Supplies.—A small Indian village is scattered along the western shore of cape Gracias harbor, from which might be obtained a small supply of cattle, poultry, and vegetables. Wood may be cut on the cay, and water obtained by digging wells on the main, but the latter is not very good, except in the rainy season. The principal settlement of the Mosquitos, and the residence of the king, is situated on the banks of the river, about 5 days' journey from the harbor, from whence are brought, for barter, gums, sarsaparilla, vegetables, fruit, hides, and canoes in the rough. The inhabitants at the harbor are generally engaged in fishing in the neighboring lagoons, and at the cays, in the turtle season.

Wanks river, named also Yankes, by the traders, and by the old Spaniards, Segovia, is the largest river of Mosquito. Its red mud banks become firm a short distance above its mouth, and it is navigable, for large canoes, to the first falls of any consequence, which are

about 150 miles up. The entrance is ½ mile wide, and open to the northeast, but very soon contracts to ¼ of a mile, and to about 200 yards only ½ mile westward of the cape.

Bars.—A bar sweeps off from each entrance point, in a semi-circular form, convex to the NE., to the distance of nearly ¾ of a mile, and generally breaks, leaving a channel of 3 to 5 feet water, according to the state of the river, to the northward of a small dry sand-bank lying E., about ¼ of a mile, from the cape; but canoes invariably enter the river by the branch in the harbor.

Cape False bears from cape Gracias á Dios NW. ½ N., distant 17 miles. The shore between forms a slight curve, and is everywhere low, swampy, bounded by a sandy beach, and covered with stunted trees and low brushwood; the soundings are 5 fathoms, about 5 miles off. Cape False, however, requires to be approached with caution, for a hard sand-bank, with less than 3 fathoms on it, extends 3 miles to the northeastward, and generally breaks. The soundings outside it deepen gradually, and, by keeping in 5 or 6 fathoms, it will be rounded at the distance of about 2 miles. There are a few huts in the neighborhood of the cape and Croach river.

Croach river, situated NW. ½ W., about 4 miles, from cape False, has a bar of 4 feet water, with 4 fathoms a mile north of it. The trees near the entrance are high and have the appearance of a bluff, and from the westward may be mistaken for cape False; it will be observed, however, that the land at the latter trends abruptly to the southward, which at once points it out. To the eastward of the above trees there are two huts on the beach, and a few cocoanut trees around them; there are also on the coast two wooded hillocks, which serve to distinguish this locality.

The coast from the Croach river trends nearly straight, NW. by W., 60 miles, to the entrance of the Patook river, and presents all along the same general features as those just described.

Carataska lagoon.—The entrance to this lagoon is ¾ of a mile wide, and lies about 18 miles from Croach river. It may be known by a large clump of trees on either side, about 90 feet high, and will be distinctly made out when bearing between S. by W. and SW. by S. A bar extends across the opening, at the distance of about ¾ of a mile, upon which there are 8 feet water in the deepest part; and within it, for about 2 miles, the channel carries from 9 to 18 feet, but beyond this, in the interior, the depths are only from 5 to 7 feet.

This immense lake runs parallel with the shore, for about 40 miles, and is about 8 miles in breadth, and only separated from the sea by a narrow, low ridge of sand, thinly wooded, with here and there a few sand hillocks about 20 feet high.

About 7 miles westward of the entrance, there is a remarkable grove of cocoanut trees, and 1½ miles farther on, a little wooded hillock, 128 feet high, named Auburn hill, under which are some deserted huts.

Tobacoonta creek, which is open only in the rainy season, is 30 miles from the entrance to Carataska lagoon, and is said to be only 2 miles from its northwest end. About 2½ miles eastward of the entrance, and about ½ mile inland, there is a remarkable, large tree, which, when first seen, appears like a sail.

Patook river.—This river is 41 miles from the entrance to Carataska lagoon, and the coast between it and cape False is everywhere clear. The east point of entrance to the Patook is sandy, with a large clump of trees on it; the west point is also sandy, and has a few huts on it. The mouth is ¾ of a mile wide, and, as the land turns from it abruptly to the westward, the east side forms a prominent point, readily distinguished from the eastward or westward. On the bar there are 6 feet water, in the dry season, and from 8 to 10 in the wet; the stream is so rapid that, even in the dry months, it runs out at the rate of 1½ knots; and although the rise of tide extends up it some miles, the water is fresh and drinkable just within the mouth, in the rainy season. From the eastern point a shallow spit runs off a mile to the northwestward, so that the channel over the bar generally lies on the west side, but it changes with the weather and the state of the river.

This river is said to rise in a ridge of mountains which separates it from the river Wanks, and receiving several large tributaries, flows 150 miles. Small canoes reach its source after six or seven days' journey in the dry season, and are also able to communicate with Brewer lagoon; and it is navigable for large trading canoes upwards of 50 miles. About 40 miles up, there is a large Mosquito village near the right bank in a rich savanna, and a day's journey from the mouth of the river there is another settlement, where are reared poultry, cattle, and horses, the latter running wild in vast numbers in the neighboring savannas. The banks are extremely fertile, and produce abundance of vegetables, tobacco, and rice; the two latter articles are bartered with the neighboring Indians, for export to Honduras, and numbers of the largest sized canoes are sent to Jamaica and elsewhere, in the rough.

Mosquito bank.—Between the parallels of Little Corn island and cape Gracias á Dios, a distance of 163 miles, the edge of the great bank extending off the Mosquito coast, runs about NNE., and on the parallel of the cape it is 93 miles from the land. Everywhere it is steep-to, so much so that the first cast obtained will most probably be 20 fathoms, not more than 5 miles within the edge, and in many parts at even a less distance. On the outside of this enormous wall, where deep soundings have been obtained, the bottom is composed of white sand, very much finer indeed than that on the bank, sometimes containing a few small broken shells, generally bivalves. On the bank the bottom is mostly

coral sand. In a few places there is coarse ground formed of what appears to be small, flat, white stones, about $\frac{1}{2}$ of an inch in diameter, with rough corrugated edges, which are found to be portions of a marine plant completely incrusted with coral, to which the term coral crust has been given. Where the depth suddenly decreases to less than 10 fathoms on small patches, the bottom is generally rock.

By an examination of the chart, it will be seen that until within about 25 miles of the main, the depths are extremely variable, and, in many places, very suspicious and alarming, especially to the southward, and southeastward of the Mosquito cays, where the bank has not been closely sounded.

From lat. 15° N., the edge of the bank trends N. by W., for 30 miles, when it is broken by a narrow vein of deep water, for about 8 miles, and then continues on in the same direction, about 60 miles, to the northeastern extremity of the bank, in lat. 16° 38′ N., long. 81° 45′ W. The remarkable vein of water just noticed, forms the upper part of what may be termed a deep gorge, carrying 105 to 150 fathoms, which nearly separates the main bank from an extensive submarine plain of coral sand, 70 miles long, north and south, and about 40 miles broad at the south end; it is so flat, that the depth, over the greatest part, only varies from 13 to 18 fathoms, and the edge is so steep, that in standing towards it from the southward or eastward, the first cast will most likely be 16 fathoms. The eastern extremity is in lat. 15° 30′ N., long. 80° 56′ W.

About 8 miles in a northeast direction from the north end of the above flat, there is a knoll of coral sand, 8 miles in diameter, named Thunders knoll, carrying from 15 to 20 fathoms water; and in the space between the depths are from 120 to 150 fathoms.

From the position given before of the northeast extreme of the main bank, the edge curves round to the northwestward, for about 20 miles, when it reaches the northern extremity, in lat. 16° 49′ N., long. 82° 6′ W. From thence the northern edge of the bank extends, with a few slight undulations, WSW. $\frac{1}{2}$ W., 128 miles, when it comes within only 18 miles of the coast, on the meridian of Patook point. This side is by no means so abrupt as the eastern face. The first soundings may be from 40 to 30 fathoms, about 5 miles on the bank, and the depth will afterwards gradually and regularly decrease to 20 fathoms, within about 5 miles of the outer cays.

On the northeast part of the bank, the bottom is formed of finer sand, which is sometimes mixed with small black specks, and minute shells. As the cays are approached, the sand gradually merges into blue mud, which, off the northwest end of the Hobbies, becomes pale, and so soft that it is often washed off from the arming before the lead reaches the surface.

Mosquito cays.—As already stated, from the Man-of-War cays to the parallel of Brangmans bluff, a space of 60 miles, the Mosquito bank appears to be free of danger, although the soundings in many places

are extremely suspicious; but northward of lat. 14° an extensive range of cays and shools lies off the Mosquito shore.

SE. rock, the southeasternmost danger, is a small rock which only sometimes breaks, bearing E. by N., 50 miles, from Brangmans bluff, and 30 miles from the edge of the bank, in lat. 14° 11′ N. It has 9 fathoms close to, but the ground to the southward is very foul; and SSE., 10 miles, from it, just within the general depth of 10 fathoms, there is a small coral head of 5½ fathoms, with 13 fathoms close to the eastward of it.

Ned Thomas cay, the southwesternmost of the Mosquito cays, is only a little ridge of sand, 2 feet out of the water, lying W., 18 miles, from SE. rock, and 25 miles from the nearest part of the main. To the eastward of this cay, for the space of 5 miles, the ground is very foul, and there are some heads awash, named the Witties, the southernmost of which lies SE. ½ E., 6 miles, from the cay. A coral ledge, awash, with 7 to 10 fathoms close outside it, lies about ¾ of a mile westward, and foul ground extends 2 miles northwestward from the cay.

Nassa cays, situated NW., 12 miles, from Ned Thomas, and 15 miles, from the mainland, is a cluster of low rocks, about a mile in extent, from north to south, and the southernmost is covered with bushes to the height of 10 feet above the sea. There are 6 and 7 fathoms water within ½ mile around them, but S. by E. ¼ E., 1½ miles, from the south cay, lies a small coral patch of 4½ fathoms; and NW. by W. ½ W., 4¼ miles, from the north cay, there is a dangerous head of only 3 fathoms water.

Mosquito cay, the largest of the group, lies E. by N., 11 miles, from the Nassa cays. This island is formed of indurated mud and sand, and is 2 miles long, NE. and SW., and about ¾ of a mile broad. It is bounded by mangroves, but in the center it is covered with trees, that grow to a height of 60 feet above the sea, and which may be used for firewood. There is a well at the south end of Mosquito cay, but the water is brackish, except after heavy rains. The mangroves, however, grow so closely that the landing spot leading to it is very difficult to find.

Anchorage.—Good anchorage, for small vessels, will be found off the southwest end of Mosquito cay, in 16 feet water, about a mile from the cay; but it is only the fishermen who can thread their way into it.

Waham cay.—This little islet, named also Stony island, is about 200 yards in extent, and lies NW., 7 miles, from the Nassa cays. It is covered with brushwood and trees, the tops of which are about 20 feet above the sea. To the westward of this cay there are several small coral patches of 3 fathoms water, with 6 and 7 fathoms close to them; the outermost patch bears SW. by ½ W. from the cay, distant 1¼ miles, and, in standing towards it, Toro cay should not be brought to bear northward of N. by E.

Toro cay, the westernmost of the Mosquito cays, situated NNW., 2 miles, from Waham cay, and 10 miles from the entrance of Duckwara creek, the nearest part of the mainland, is composed of rough pieces of bleached coral, thrown up by the waves to the height of about 3 feet above the sea; westward of it, to the distance of about ¾ of a mile, the soundings vary from 7 to 4½ fathoms, but beyond this they become regular, increasing to 10 and 11 fathoms over a crust, and muddy bottom, about mid-channel, and from thence decreasing to 3 fathoms, to within about a mile of the shore. To the eastward of Toro cay there are numerous dangers, and the passage is unsafe. At 1½ miles, NE. by E., there are three similar rocks, about 5 feet high, named the Kissoura cays.

NW. knoll is a pear-shaped, coral shoal, about 1½ miles in extent, north and south, and about a mile broad, with irregular soundings of 4½ to 8½ fathoms on it, and 10 fathoms on the edge. It lies 6 miles from Toro cay, with it and Waham cay in line, SSE., and 4 miles from the main bank of the Mosquito shoals. In working up this channel in the night, it may serve as a useful warning, for the depth to the eastward of it is from 9 to 10 fathoms.

Caution.—In the daytime, when standing to the eastward in this neighborhood, a vessel should not go so far inside this knoll as to bring the westernmost of the Kissoura cays in line with Waham cay, bearing S. by W., to avoid the Indian shoal, which is 4 miles from the Kissoura cay.

Ham cays and Mosquito shoals.—From the Kissoura cays, the northwestern edge of the Mosquito shoals trends about N. by E., 8 miles, where it terminates at the northwesternmost of the Ham cays, which is about 3 feet above the sea, and of similar size and formation to the Kissoura cays. From thence the edge trends NE., 2½ miles, to the extreme northwest point, which lies SSE. ½ E., 27 miles, from cape Gracias á Dios, between which there is no danger whatever, and the depths are 8 to 13 fathoms on a muddy bottom.

From the northwest point, the northern boundary of the Mosquito cays and shoals runs in an easterly direction, 20 miles. About half way, however, there is a channel from 1 to 3 miles wide, carrying from 9 to 12 fathoms, cutting the banks into two parts, well known to the fishermen, but no safe directions can be given for strangers; the western part is called Morrison cays.

The eastern boundary of these cays, between Martinez reef, at the northeastern extremity, and SE. rock, trends about S. by E., 30 miles, and is skirted by detached rocks and reefs, so extremely dangerous that too wide a berth cannot be given to it; more particularly as the equality of depth gives no warning whatever of approach; these reefs and rocks are named Nee reef, Porgee reef, London reef, and Tinkham rock.

To the northward of the Mosquito cays and shoals, for a distance of

40 miles, numerous small islets and detached reefs present themselves, between which are clear and deep channels, which might save a vessel accidently getting amongst them; but lying entirely out of the general track, they need no particular description. The principal ones are Edinburgh and Alargate reefs.

Edinburgh reef lies ESE. ¼ E., 30 miles, from cape Gracias á Dios, and is about 4 miles in extent, from north to south; it is crescent shaped, the convex side being to the eastward; on the western side of this reef, in latitude 14° 48′ 30″ N., longitude 82° 43′ W., there is a shoal, breaking only when the sea is rough.

Alargate reef is the easternmost danger on the Mosquito bank; its northeastern edge lies E. ½ N., 50 miles, from cape Gracias á Dios, and 45 miles from the outer edge of the bank. This is a solid semi-circular reef, 9 miles in extent, north and south, convex to the east, and upon which the sea breaks with great violence. Its eastern face has 15 fathoms alongside it, and from this quarter the soundings give no warning. The space on the west side is full of detached coral shoals, and 6 miles from the center of the crescent, there is a little sandy cay, with a single cocoanut tree upon it, which serves as a guide to the fishermen.

A space of 20 miles to the eastward of the Alargate is filled with small cays, skirted by similar reefs, which approach to within 28 miles of the mainland, leaving a clear, navigable channel between, carrying from 10 to 13 fathoms. These are named Hall rock, Robel cay, Half-moon cay, Logwood cay, Half-moon reefs, Savanna reefs, Porpoise cays, and South cay. This group is separated from Edinburgh reef by a channel 11 miles wide, in the middle of which, N. by E. from Edinburgh reef, are Cock rocks, which cover.

Main Cape bank.—This extremely dangerous reef, 4 miles in length, north and south, and slightly convex to the eastward, is nearly awash in many places, seldom breaks, and is steep-to; the discolored water, however, may be seen from aloft in clear weather. The south end of the bank bears NE. ¼ N., 18 miles, from cape Gracias á Dios.

False Cape bank.—This equally dangerous ledge is only 2 miles long, northwest and southeast, convex to the northeast, and, being completely exposed from that quarter, generally breaks. It lies NE., 25 miles, from cape False, the nearest part of the main, and all around it there are 14 and 15 fathoms.

Cocorocuma cays, situated N. by E., 11 miles, from False Cape bank, is a cluster of seven small islets, occupying a space a little more than a mile in extent, but neither of them more than 2 feet above water. They are all fringed with a border of coral, dry in many places, which extends 200 yards westward, 400 yards northward, and about 300 yards eastward, but to the southward scarcely 100 yards.

The largest cay is about 200 yards in extent, from east to west, and about half that in breadth; its east end is covered with bushes, and upon it are 5 cocoanut trees, the tops of which are about 20 feet above the sea; at the eastern extremity there are also two other remarkable trees. The west end of the cay is sandy, and affords a landing place, but the little, intricate opening through the reef to the southward, which leads to it, is only recognized by the smoothness of the water.

In the month of July the island is covered with young birds; and among the cays there is excellent fishing with the line, but no fresh water.

The northernmost islet lies a mile from the largest, and is called, by the turtlers, Simons Bush cay, from its having upon it a remarkable square clump of brushwood, which grows to the height of about 15 feet above the sea, and at a distance look like a large isolated rock. From this cay a reef extends 4 miles, in a NNE. direction, which breaks heavily in the finest weather; it has the usual curve to the eastward, and is in every respect similar to those already described. West, ¾ of a mile, from the north end of the reef, there is a dangerous detached breaker.

Anchorage will be found under the west side of the above reef, but not good, as the bottom is a flat shelf of rock. The best ground and shelter lies about ½ mile northwestward of the largest cay, in 6 or 7 fathoms.

Pigeon cays.—The westernmost of the three Pigeon cays is a little islet, lying ENE., 4½ miles, from the Cocorocuma, at the south end of a dangerous, half-moon shaped reef, about ½ mile in extent, north and south, and is merely a heap of coral and sand, over which the sea breaks in heavy weather. It is bold-to, and between it and Cocorocuma cays there are 14 fathoms water.

At 2¾ miles, ESE., from this cay, are the two easternmost. These narrow islets are each about 200 yards long, NNE. and SSW., and only separated by a shallow ledge 40 yards broad, and they are not more than 1½ feet out of the water. The southern cay is formed entirely of sand and coral stones. A reef extends about 200 yards from each end, and to a short distance from the east and west sides, so that landing is not easily effected. There are 20 fathoms close to the north and east sides of these islets, and 12 fathoms between them and the western cay.

Cay Gorda, the northeasternmost islet on the Mosquito bank, lies in latitude 15° 52′ N., longitude 82° 24′ W., and S. by W. ½ W., 60 miles, from the north extremity of the Mosquito bank. This barren islet is about 200 yards in diameter, and formed of sand, broken pieces of coral, and large stones, thrown up by the violent action of the waves to the height of about 12 feet. From the north end, a reef extends to the northwestward, 1¾ miles, which is awash at low tide. It is very steep-to on its east and south sides, and in favorable weather a landing may be

effected at its northwest end, but even then it is attended with risk, for a heavy swell rolls in upon it at all times.

The Farrall rock, lying E. by S., 5½ miles, from Gorda cay, is an exceedingly dangerous coral ledge, nearly ½ mile long, north and south, which only breaks in heavy weather. It rises, however, from a clear white sand-bank, so that the dark, discolored water over it may be seen from aloft in favorable weather when not far off.

By reference to the chart, it will be seen that these two dangers lie at the north end of a flat tongue of coral sand, 40 miles in length, NW. and SE., which might serve as a good guide to vessels necessitated to pass eastward of the Mosquito cays. In the center, the tongue is only 5 miles broad; but from thence it spreads out, and is 17 miles across at both extremities. The depth only varies from 10 to 6 fathoms, and the bottom is distinctly seen. The southeast end lies NE., about 15 miles, from the nearest part of the Alargate reef, and there are from 13 to 15 fathoms between them. Farrall rock is on the northeastern extremity, and the depth is 13 fathoms 2 miles to the northward of it, 20 fathoms 9 miles to the NE. and NW. of it, and 14 fathoms at the same distance in a SE. direction, over fine, white sand. On the northern portion there are many patches of flat coral, covered with dark weed, but with no material alteration in the depth.

Caxones, or Hobbies, the northwesternmost danger on the Mosquito bank, is a broken reef extending in an ESE. and WNW. direction, 14 miles. The eastern extremity lies NNW. ¼ W., 15 miles, from the north end of the Cocorocuma reef, and about 27 miles within the northern edge of the bank, on the meridian of 83° 7′ W. This end has the usual curved face, and is about 2½ miles broad; but to the westward of this it becomes narrower, and the opposite extremity terminates at almost a point.

The eastern portion of the reef is much broken, and has upon it several small low cays and sand-banks, of the same character as those described elsewhere, only one of which is covered with stunted bushes to the height of 5 or 6 feet above the sea, and has a single cocoa-nut tree. This islet, named the Grand Hobby, by the fishermen, lies about 3 miles from the east end; it is about 200 yards in diameter, and its position is often pointed out from a distance by a cloud of birds hovering over it. Abreast it, both to the northward and southward, there are intricate but deep openings through the reef, leading into small snug anchorages, well known to the Caymen fishermen, but far too dangerous for a stranger to navigate without their assistance. However, in a case of danger occurring on the north side of the reef, by bringing the Grand Hobby to bear SSE. before it is within the distance of 1½ miles, a vessel may enter through a clear opening, ¾ of a mile wide, with not less than 5 fathoms in it.

The east side of the opening is formed by the end of the reef, on which the sea generally breaks; on the west side there are two little cays and

a sand-bank, lying on a dry ledge, abont 1 mile in length, SE. and NW. The southeasternmost of these cays may be passed within 300 yards, and anchorage taken up within it, in 7 fathoms, under the eastern reef, with the Grand Hobby bearing S. by E. ½ E., distant about ¾ of a mile or midway between it and the reef.

There is also a clear opening to the westward of the above three cays, 1½ miles wide, which might be used in a case of necessity, and anchorage taken up close under the cays, in 10 fathoms. To the westward of this the reef is narrow and unbroken, and, although nearly dry, does not always break, which renders it extremely dangerous.

Caution.—In approaching the Caxones from the northward in the night, or in hazy weather, care is necessary not to shoal to a less depth than 20 fathoms, which is about 4 miles off; and it must be borne in mind that outside this line the bottom is muddy, and inside, coral and sand, which is also a good warning. As stated before, off the northwest end the mud is so soft that it is often washed off the arming before the lead reaches the surface; and too much caution cannot be used when nearing this extremity, which is 18 miles from the edge of the bank. None but small vessels, keeping a good lookout, should come within the 30-fathom line of soundings, which is 7 miles off.

There is excellent fishing all around the cays, and good seining at the Grand Hobby.

Tides.—It is high water, full and change, at the above cays, at 9h. 20m., and the rise is about 2 feet.

Carataska cays are two narrow, barren sand-ridges, about 1½ feet out of the water, and 1½ miles apart, bearing from each other SSE. and NNW. The northernmost cay is about 200 yards long, north and south; it lies S. by W., 4 miles, from the west end of the Caxones, with a depth of 13 fathoms between. The southernmost cay is not so long, but semicircular in form, convex to the NE. Both are steep-to on their eastern sides, to within 200 yards of a dry reef which surrounds them, but from the outer end this reef extends more than ¼ of a mile, and to nearly the same distance from their west sides. The channel between them is clear, and well defined by the dry rocks on either side, which are steep-to.

Anchorage.—There is good anchorage under the west side of the Carataska cays, in 4½ or 5 fathoms water, with the south cay bearing about E., and the ends of the reefs, forming the channel, in line, which shelters from the prevailing winds.

Seal cays, situated 5 miles, SE. by S., from the southern Carataska cay, consists of five small islets lying on a broken coral ledge, 3½ miles in length, NW. and SE., and about ¾ of a mile broad.

Two of the cays are at the north end of the ledge, and have small bushes on them; the others lie more towards the south end. On the

largest islet there are some mangroves, and a few cocoa-nut trees, which attain a height of about 30 feet above the sea. This islet is protected on the eastern side, from the violent action of the waves, by a breakwater of large masses of broken coral and stones, thrown up to the height of about 3 or 4 feet. At the western side of this cay is a boat channel leading to a safe landing place, where, in the rainy season, fishermen are able to obtain a small supply of water.

Seal rock.—A coral ledge, with 6 to 8 fathoms water on it, and 14 to 15 fathoms near its edges, extends 4½ miles to the southeastward from the South Seal; but SE. ½ E., 3 miles, from the Great Seal, and NE. by E. ¼ E. from the North Vivorilla cay, lies a dangerous small rock, called Seal rock, upon which the sea breaks in rough weather only, and from which the seal cays appear as only two islands.

Vivorilla cays.—These two small cays are distant from each other 1¾ miles, on a S. by E. and opposite bearing. The northernmost cay lies SW. ½ S., 4½ miles, from the Great Seal; it has upon it a few mangrove bushes, which, at a distance, have the appearance of a house. From this cay a solid reef, contrary to the usual form, extends in nearly a straight line, SSE. ½ E., to abreast the southern cay, leaving a boat channel between them; it is steep-to, and the sea breaks against it with great violence; at the south end there are some dry sand-banks. The bushes and cocoanut trees on the cays are often destroyed by gales of wind, so that the numbers or size cannot be depended on; the cocoanut trees, however, are generally planted again by the Indians and fishermen, as a guide to find them, but they take some time to grow.

Directions for South Vivorilla cay.—In making the Vivorilla cays from the northward, leave the northern cay at least a mile to the eastward, and steer S. by W. ½ W. until the south cay bears SE. ½ S.; then haul up and steer for the center of the south cay; and when the wharf bears SE. ½ E., and the house at north end of the cay E. by S., anchor in 2¾ fathoms. If drawing more than 12 feet, anchor in 3 fathoms, with the wharf bearing SE.

In making the cays from the southward, give the southwest point of the south cay a berth of ½ mile; steer to the northward until this cay bears SE. ½ S., when follow above directions.

Smooth anchorage with the prevailing wind will be found in 5 fathoms, with the northern Vivorilla cay bearing N. by E., and the southern cay E. ½ N.; but it will be necessary to look out for a sandy spot, which is easily done by the eye, and to bear in mind that the depth decreases suddenly from 17 to 7 fathoms.

Western shoals.—From the northern Vivorilla cay a coral bank, about 4 miles broad, stretches off in a northwesterly direction, 8 miles, and upon it the general depths are from 6 to 10 fathoms; but WNW., 6 miles, from the cay, lies a small head of 3½ fathoms water; and W. ½

N., 7½ miles, from the cay there is another with a similar depth at the southwest point of the bank. On the edge of the bank, 4 miles NNW. ½ W. of the northern Vivorilla, is a shoal of 3 fathoms. These are the westernmost shoals on the Mosquito bank.

Western knoll.—At about 30 miles westward of the Vivorilla cays lies an oval-shaped coral knoll, 9 miles long, north and south, and 4 miles broad in the middle, with depths from 7 to 9 fathoms over it, and 17 fathoms close to its edges. Its south end bears E. ¾ N., 26 miles, from Patook point, and 20 miles from the nearest part of the main, and the depth decreases very gradually from it to the shore. Its north end is 12 miles within the edge of soundings, and there are 26 fathoms within a mile of it. Between the east side and the Vivorilla bank, the depths are from 20 to 30 fathoms, and when working up in the night it may be a useful warning of approach to those dangers.

Directions for Mosquito bank and cays.—The range of cays and reefs between the Mosquito and Vivorilla cays may be said to form an impassable barrier to the coast, for, although there are many wide navigable openings, which might lead to saving a vessel in case of accident, and which are generally well defined by the steep reefs breaking on either side, the currents and the nature of the sounding forbid the approach of strangers.

This neighborhood, however, is well known to the Cayman fishermen, who visit the cays in the turtling season, and they are consequently good pilots for it. At this period the masts of their little sloops at anchor, and the tops of their crawls, may be seen before the reefs. These crawls are square pens, for confining the turtle as they are caught in the nets, and are constructed of piles driven into the mud, leaving the tops about 6 or 8 feet above the sea.

The only safe way, therefore, of navigating the coast, from Greytown to the northward, is by passing between the Corn islands and Pearl cays, which are 18 miles apart—and well outside all the others as far to the northward as the Man-of-War cays. As already pointed out, the approach to these islets is extremely dangerous, as the regularity of the soundings gives little or no warning; and a sailing vessel cannot give them too wide a berth.

From abreast the Man-of-War cays, which lie on the parallel of 13° N., the soundings within 30 miles of the coast are very regular, and decrease from 17 or 18 fathoms gradually towards it. The shore may now be safely navigated, or within the depth of 10 fathoms, which will be found at about the distance of 7 or 8 miles, and skirted along thus far off all the way to abreast the river Wava, 50 miles to the northward of the cay. Upon this parallel the depth will decrease to less than 10 fathoms, to the distance of 20 miles from the land; and to 8 fathoms, about 5 miles to the eastward of the red cliffs near Brangmans bluff.

A sailing vessel, however, with the prevailing wind, after passing the

Man-of-War cays, had better keep well to windward, but not run to the northward of the bluff without sighting it, in order to avoid the dangers at the southwest end of the Mosquito cays. The soundings here will be of great assistance, for the depth of 9 fathoms for a short distance will give a sure warning of being from 10 to 20 miles from the bluff, and its bearing between N. and NW.

To the northward of Brangmans bluff, the shore must be kept aboard, and not lost sight of, to avoid the Mosquito cays; and should night intervene, with a foul wind, it would be better for a sailing vessel to remain at anchor until daylight, as the channel between the Toro cay and the main is only 9 miles wide, and the bottom is so flat that the lead is not a sufficient guide.

After passing northward of the Ham cays, a clear space opens out, which is about 25 miles wide abreast cape Gracias á Dios; and the depth increases from 10 to 14 fathoms, close up to the eastern cays and reefs, on a muddy bottom. Having rounded the cape, should it be necessary to stand to the northeastward, great care must be taken to avoid the Main cape bank, which lies NE. ¼ N., 18 miles, from it. This reef is the more dangerous, as, lying under shelter of the eastern cays, it seldom breaks, and the soundings up to it, for some distance, are so regular as to give no warning. The depths in mid-channel are from 10 to 12 fathoms, from whence they gradually decrease to the coast; but towards the reef, there are regular soundings of 12 to 13 fathoms, on fine sand, close up to it.

To the northward of False cape, the channel again opens out to a breadth of 23 miles abreast False cape bank, where the depth in mid-channel is 14 fathoms; and between the entrance of the Carataska lagoon and the Vivorilla cays, it is 35 miles wide, and the depth in, midway, is 17 and 18 fathoms over pale blue mud. At the distance of about 10 miles from the coast there are 10 fathoms, and 7 miles from the cays there are 20 fathoms, so that a vessel may here safely trust to the lead. Care, however, is necessary not to haul out to the northward until the Vivorilla cays are 10 miles to the eastward, except in vessels of light draught, which may cross the Vivorilla ledge in daylight, and take their departure from the cays, so as to steer clear of the west end of the Caxones.

A vessel bound to Greytown from the northward, intending to pursue the in-shore channel, should by no means strike the bank to the eastward of the meridian of the Carataska lagoon, 83° 45′ W., nor come within the depth of 30 fathoms in the night, except she is sure of being to the westward of the Caxones, and the cays and shoals in its neighborhood; and should she unexpectedly find herself in a less depth, her head should immediately be put to the northward.

Approaching from this quarter, it would be extremely advantageous to sight the Swan islands, in order to obtain a correct departure, with a view to detect the force of the current, which here generally runs from

between W. and NW. These two islands occupy a space of about 3½ miles in length, east and west, and ½ mile in breadth; they are thickly wooded, and are about 60 feet high, and lie N. ½ W., 120 miles, from the entrance of the Carataska lagoon, which line leads just to the windward of the Western knoll.

Current.—On the chart, to the northward of the Pearl cays, the current is marked as running to the northward and northwestward at a velocity of from ½ to 1 knot an hour; but this must only be considered as its general course, for—except on the east side of the bank—it is subject to great and very sudden changes; indeed, several navigators assert that it more generally runs to the southward; this, however, was not found to be the case during the survey of these cays.

Among the islets and reefs there is very little stream of any kind, except on the outer edges, where, in the season of fresh NE. winds, especially on the eastern face of the Alargate reef, and on the north side of the Caxones, there is often a strong set towards them, which adds considerably to their danger. In-shore, to the northward of Greytown, it is greatly influenced by the winds and weather; and after heavy rains in the summer, or Northers in the winter, it will suddenly rush down from the northward at the rate of 2 and even 3 knots, bringing with it large quantities of logs and drift wood, and rendering it almost impossible for a vessel to work to the NE. against it. To the northward of cape Gracias á Dios, it will also often run with such velocity to the northwestward, as to make it equally difficult to work up from that quarter.

CHAPTER IX.

OUTLYING BANKS, CAYS, AND ISLANDS ON THE COAST OF MOSQUITO.

Albuquerque cay, the southernmost of the outlying banks, lies on the parallel of Great Corn island, 68 miles to the eastward of it, and is 40 miles from the nearest part of the Mosquito bank; it is nearly circular in form, and about 5 miles in diameter. Its northern and eastern sides are bounded by a solid reef about ¼ of a mile within the edge of soundings, which is so steep that the first cast of the lead will probably be less than 10 fathoms, which renders these sides extremely dangerous in the night. At the northeast elbow there are two small boat channels, available in fine weather in case of necessity.

Nearly midway between the north and south ends of this reef, and 1½ miles from the eastern edge of soundings, there are two cays composed of coral blocks and sand, each about 250 yards in extent, with some cocoanut trees and grass upon them. The northernmost is 6 feet above the sea, the southernmost only 4 feet, and lies SSE. from the former, 300 yards. The southernmost islet is in lat. 12° 10′ N., long. 81° 50′ 28″ W., S. by W. ¾ W., 20 miles, from St. Andrew's island, which is just visible from it in clear weather. The fishermen from that island visit them in the turtling season, but they are obliged to come furnished with water, as none is to be found on the cays.

The center of the Albuquerque bank is full of detached coral shoals, in some parts dry, with veins of deep water between them, leaving a clear space about ½ mile in breadth along the western edge of the bank. From the southwestern extremity, soundings extend nearly a mile from the shoals, with depths from 10 to 6 fathoms on sand and coral; this might serve as a warning, but at night this bank must be avoided.

Caution.—The existing plan of this reef is altogether incorrect as regards soundings. In some places where 5 and 6 fathoms are marked on the chart, there are not more than 5 feet. Rocky heads of coral formation, with from 5 to 12 feet over them, are sticking up all over the spaces marked on the chart as having from 4 to 6 fathoms.

Courtown bank.—This coral bank is irregular in shape, forming a deep bight on the eastern side; it is 7½ miles long, N.NW. and S.SE., from 1½ to 2 miles broad, and its north and south ends terminate in points. About 1½ miles within the north point, a barrier reef, convex to the northeastward, extends across the bank and along the east side, for about 4 miles, to the bottom of the bend, where it is very steep-to; the edge of soundings being scarcely ¼ of a mile off. From the north

side of the reef to the north end of the bank, the depths are regular from 5 to 18 fathoms, on coral and sand. From the bend a broken reef continues all along about ½ mile from the edge of the bank, to within 1 mile of the southern extremity. On this spit the soundings are equally regular, increasing from 6 fathoms close to the reef to 13 fathoms, over a similar bottom. The center and the west side of the bank are full of shallow rocky patches, with deep water between them.

Cays.—At the south end of the Courtown bank, there are three small cays, composed of sand and coral stones, lying nearly E. and W. from each other. The easternmost is about 1 mile from the edge of the bank, and 2 miles from the south end; it is about ¼ of a mile long, 200 yards broad, 4 feet above the sea, and covered with samphire grass and dwarf bushes. The middle cay, situated W. ¾ S., 1¼ miles, from the easternmost, is 6 feet high, having upon it bushes and a grove of cocoa-nut trees. This cay is in lat. 12° 24′ N., long. 81° 28′ 27″ W. The western islet lies W. NW. ½ W., about 800 yards, from Middle cay, and about the same distance from the edge of soundings; it is very small and low, and covered with dwarf bushes. At 1¼ miles, NW., from the easternmost of the above cays, there is also a small dry sand bank.

Water may be procured by digging wells on the Middle and East cays; it is, however, rather brackish, but used by the fishermen, whose temporary huts will be seen on all the cays during the turtling months, from March to August.

Anchorage may be taken up on the edge of the Courtown bank, but extreme care is required not to shoot in more than 200 yards.

St. Andrews island lies ENE. ½ E. 80 miles, from Great Corn island, and 40 miles from the edge of the Mosquito bank; Entrance island, at SW. cove, being in lat. 12° 31′ 40″ N., long. 81° 43′ 40″ W. It is said that the island was first regularly settled by a few of the famous buccaneers, and that some of their descendants are still among the inhabitants. St. Andrews island belong to the United States of Colombia, and is the seat of government of the territory which comprises St. Andrews, Old Providence, and the neighboring cays. The population of these islands and cays is about 3,000.

St. Andrews island is considered very healthy and fertile; cattle, poultry, vegetables, fruit, and cocoa-nuts are in great abundance. There are no running streams, but excellent spring water is obtained by digging wells on any part of the island. The island is 7 miles long, from north to south, and from ¾ to 1½ miles in breadth. A ridge of hills commencing about ½ mile from the north end, extends through the island to within 1½ miles of the south point, and rises rather abruptly on the west side. Upon it, three flat elevations, somewhat above the main ridge, are 340 feet high, which, upon a north and south bearing, appear as two hills. The north end of the island is very foul to the distance of

a mile; but the bank extends northward of the foul ground to the distance of a mile, with depths of 6 to 20 fathoms on coral sand.

Blowing rocks.—At ¾ of a mile, NNE., from Pull point, the north extreme of St. Andrews island, is a small cluster of low rocks, about 200 yards in extent, named Blowing rocks, from the great height the waves break over them in northerly winds. A shallow ledge extends 600 yards in a northeaterly direction, and the same distance in a southwesterly direction from these rocks. There are 5 fathoms water at 400 yards westward of them, and the edge of the bank is about 800 yards distant. Between the south end of the ledge and Pull point, there is a clear channel for coasters, about 600 yards wide.

Johnny cay.—At ½ mile, SE. ½ E., from Blowing rocks, is a small, low islet about 200 yards in diameter, named Johnny cay. It has upon it a remarkable grove of cocoa-nut trees, the tops of which are about 50 feet above the sea. Between the cay and the Blowing rocks, there is another good channel for coasters drawing less than 12 feet.

East reef.—From Johnny cay, a dry reef sweeps round the northeast extreme of St. Andrews island, at the distance of about ¾ of a mile from Lawrence point, and from thence trends southerly, skirting the shore 1½ miles off, until Levers hill bears W. It is all along so steep that the edge of soundings is not ¼ of a mile distant. At the above point it becomes broken and the edge of the bank turns suddenly towards the shore, which it skirts all along to the south point of the island, at the distance of about ½ mile. This part is also very foul to within 600 yards of the beach; but from the south point a narrow spit of bank extends SSW., about 1 mile, with depths from 8 to 20 fathoms, which affords a slight warning.

Anchorage.—The northern portion of the reef is so dry and solid, that it forms a breakwater to excellent anchorage between it and the island, for vessels of 18 feet draught. On the inner part of the reef, nearly 1 mile from the beach (which nearly bounds this side of the island), and 1¾ miles, S., from Lawrence point, there is a small, low, bushy islet, named Haine cay. Close northward of this cay, there is a narrow ridge of dry sand, named Rose cay. The channel into the harbor lies about ¾ of a mile to the southward of these cays; it is about 600 yards wide, but, being obstructed by two shoals, it is very intricate, and dangerous to a stranger. With the assistance of a pilot, however, a vessel will carry 3½ fathoms over the bar, into secure anchorage in 6 fathoms.

Caution.—The banks in St. Andrews harbor are reported to be growing up.

Directions for St. Andrews harbor.—In approaching the harbor from the southward, stand in with Lawrence point just open to the eastward of Haine cay, about N., until a remarkable cliff at the north end of the high land is seen a little open eastward of a low mangrove point,

upon which there are a few cocoa-nut trees, bearing N. by W. ½ W. This course will then lead over the bar, between the edge of the eastern reef and the detached shoals, which may be seen from aloft; and when Haine cay bears NE. ½ E., anchor in 6 fathoms, sandy bottom. In approaching from the eastward with the wind well to the northward, run down with Levers house bearing W. ½ N., until Haine cay is in line with Lawrence point, bearing N.; then haul quickly up until the leading mark given above comes on.

Southwest cove.—The south end of St. Andrews is of moderate height and woody; shallow ground extends from it 400 yards. From thence the western shore is composed chiefly of rocky ledges and cliffs, forming several rounded headlands. The soundings do not reach more than ¼ of a mile from the shore; it is all along clear and bold, with 5 to 12 fathoms, over dark coral bottom, to within about 300 yards of the shore.

The only indentation of any importance is about 2½ miles from the south point. Here, under Levers hill, the shore forms a small bight in which there is good temporary anchorage, in 7 fathoms, on clear sandy bottom; the western extreme of the land bearing N. by W. ¼ W., and the entrance of a cove bearing from NE. by E. ½ E. to E., about 300 or 400 yards from the shore.

The entrance of the southwest cove is only 40 yards wide, but it opens into a basin nearly 400 yards in length, where a vessel may lie alongside the northern shore, and careen in safety. It will of course be necessary to warp in, and it will be better to do so by the stern, dropping an anchor just within the entrance, and mooring with hawsers to the shore on either side. In this way two or three small vessels may lie here in safety, lashed alongside each other. On the south end of the entrance is Entrance island.

Supplies.—There is a well of good water about 200 yards from the landing place in Southwest cove, where water may be procured in any quantity; it is, however, attended with considerable labor, for the casks have to be rolled nearly ¼ of a mile along the road. Very good firewood may be cut close to the beach. Stock and vegetables are in great abundance.

Current.—Off the north end, the current generally sets strong to the westward, except during and subsequent to Northers, when it runs to the southward. Occasionally it turns to the northeastward, and it may be considered a locality where variable currents are experienced.

Old Providence and Sta. Catalina islands.—Old Providence, like the neighboring island of St. Andrew, was an early possession of the Buccaneers; and a most remarkable black rock, 40 feet high, off the west side of Sta. Catalina, resembling a colossal human face, bears the name of Morgan, one of their most sanguinary chiefs. None of their

works, however, now exist, except a small fort, nearly in ruins, on the south end of Sta. Catalina, named Aury, from a leader of note in the war of independence, who used the bay. It is remarkably healthy, and extremely fertile in all the tropical productions, and rears abundance of stock.

The island, including Sta. Catalina, which is only separated from its north end by a narrow channel, is of volcanic formation, 4½ miles long, from north to south, and 2¼ miles broad about the middle. Its center is mountainous, and, within a short compass, rises into three peaks nearly of the same altitude, the highest being 1,190 feet above the sea, and visible in clear weather from a distance of 40 miles. From these heights large, rugged, irregular spurs branch off to almost all parts of the island, terminating at the shore in peaked hills, from 300 to 700 feet high.

Towards the north, one of these ridges descends somewhat more gradually, on almost a straight line, to that extremity of the island. Nearly a mile from Jones point, a peak rises from this ridge to the height of 550 feet above the sea, named Split hill, from its having been rent asunder by some violent action of nature; and which, when seen from the NW. or SE., shows a rocky chasm, 60 feet wide and 80 feet deep, which is a most remarkable and useful object. The only indentation of any importance is at the northwest end of the island. Here, between Morgan head and the northwest point of Old Providence, a bay is formed, ¾ of a mile wide and the same deep, which is so protected by shallow ledges to the westward, as to make a secure harbor for a few vessels of 15 feet draught.

The chief settlement on the island is scattered along the shore of this bay. The largest house in the village of Isabel is situated in lat. 13° 22′ 54″ N., long. 81° 22′ W. From thence a rough bridle road extends round the island.

Wood and Water.—The mountains and hills being of rocky formation are but scantily covered, and consequently afford no wood of sufficient size or quality for spars or shipbuilding; but there is no difficulty in obtaining firewood, which may be conveniently cut and embarked from Sta. Catalina, by permission of the owner of that island.

A spring, taking its rise in the upper peaks, descends to the shore in four streams, two flowing out on the east side of the island, and two on the west. In the dry season, however, they have not sufficient strength to clear a passage to the sea, and at this period their mouths are generally closed up. The best watering place for vessels is at the southernmost stream, near the middle of the west side of the island, ½ mile to the southward of some remarkable white cliffs; but to obtain good clear water in the dry season, it will probably be necessary to cut a small pathway, in order to roll the casks up about 200 yards.

Bank and reef.—Old Providence bank, on which is situated Old Providence island, lies 38 miles from the Mosquito bank, is 18 miles in length, NNE. and SSW., about 6 miles in breadth, and of the most dan-

gerous character. The south end of the bank is about 2½ miles from the south end of the island, and the edge extends to the northward at the distance of 1½ to 2 miles from the east and west sides.

At 1¼ miles south of the South hill, a solid barrier reef commences, which, skirting the east side of the island at the distance of a mile, extends northerly from abreast Sta. Catalina, for a distance of 4 miles, to a patch of dry rocks. Here it curves to the eastward for nearly a mile forming a bend, at the bottom of which there is a small intricate opening, which might save a vessel in case of accident. Thence it again takes a northerly direction, for 3½ miles, to the angle of an elbow nearly 8½ miles from Sta. Catalina, the High peak of Old Providence bearing S. by W. ¾ W. From thence it turns sharply to the westward, and, at the distance of 2¼ miles, terminates at Low cay, composed of coral and sand, 2 feet out of the water, from which the High peak bears S. ½ W.

The west side of the bank, from abreast Low cay, trends SSW., for about 7 miles, in a waving line. Here, with Crab cay, which is 75 feet high, in line with Basalt cay, SE. ¼ E., the latter distant about 2½ miles, it forms a bend which brings the edge to within about a mile of Sta. Catalina island. Thence it sweeps off to the SW., to abreast Catalina bay, when it again runs southerly at the distance of 1½ miles from the land, and terminates at a rounded point, SW., 3 miles, from the South hill. The whole of this side is very foul, with the exception of the anchorage under Low cay, and a space about 1½ miles in extent westward of the harbor.

On the northern part the thickly clustered shoals lie in some parts within ½ mile of the edge of soundings, and abreast the islands to within even 400 yards, which renders the approach to the island in the night extremely perilous. The water is so clear that, in the daytime, the eye will greatly assist the pilotage.

The bank extends 1½ miles from the south end of the reef, with depths from 6 to 16 fathoms on dark coral bottom. Abreast the middle of the east side of the island, the edge is about ½ mile off the reef. From thence its distance gradually increases until off the elbow, where it extends 3 miles to the eastward, with depths from 6 to 16 fathoms over coral bottom; and 2¾ miles NE. of it, with depths from 14 to 19 fathoms on coarse coral sand. From thence the edge curves to the westward with the reef, and comes within less than ½ mile of Low cay. On this latter part, also, the soundings only vary from 10 fathoms at ¼ of a mile from the breakers, to 19 fathoms close upon the edge of the bank, over the same bottom.

From Low cay a coral ledge, partially dry, extends SSW., 1,200 yards, with depths of 7 fathoms close-to. For the space of about a mile to the southward of it, the bank is quite clear, with a sandy bottom, which affords good anchorage in 6 to 10 fathoms. Care, however, must be taken to keep the cay to the eastward of N. to avoid getting entangled among the detached shoals to the westward of the reef.

Tinkhams cut.—With the southwest extreme of the island bearing NW. by W. ¼ W., and the east extreme, NNE. ¼ E., there is a narrow, intricate cut, named Tinkhams cut, through the reef, carrying 18 feet water, which might be made use of in case of necessity. Between the barrier and the island, there is passage from 200 to 800 yards in breadth, carrying from 3½ to 6 fathoms water, which, although obstructed by shoals here and there, is easily navigated by an experienced eye, and affords good sheltered anchorage for coasters. Indeed, a vessel of 18 feet draught can lie up under the Brothers, and refit with great convenience and security.

Anchorage.—If the visit is to be short, vessels of heavy draught will find a smooth and convenient anchorage, for communicating with the village, on the edge of the bank, in 5 fathoms; Morgan head, SSE. ¾ E., 1 mile distant; and Basalt and Palm cays nearly in line, bearing E. ½ S. These cays are very small; the former 45 feet, the latter, with some cocoanut trees upon it, 35 feet high; and they lie close together at the distance of about ⅛ of a mile to the northward of the northeast point of Sta. Catalina. The anchorage must be approached under easy sail, as there is little room to forge ahead.

If intending to water, the anchorage about 1½ miles to the southwestward of the above will be found more convenient. In this case it will be best to approach the bank from the northward, taking care to keep Alligator point, the west extreme of Providence, to the eastward of S. ½ E., to avoid the shoals off the west side of the island. A good berth will be found in 6 or 7 fathoms, with Basalt cay, NE. by E. ½ E., and Alligator point, S. by E. to SSE. Should it be necessary to make a board to the southward, on the bank, Basalt cay must not be brought to bear northward of NE. ½ E.

Directions for Catalina harbor.—In approaching the islands from the northward, having made the end of the reef—which, breaking heavily, may be seen at a considerable distance—should daylight fail, it will be better to anchor under Low cay for the night.

Strangers intending to enter Catalina harbor should take a pilot, and great care must be observed in running along the western edge of the bank for this purpose. To enter the harbor in a vessel drawing 13 feet the wind should not be to the eastward of ENE. Standing in on the port tack, the edge of soundings must be struck with Morgan head in line with Fairway hill, SE. ½ S. This mark will lead in between the outer shoals, in 15 to 21 feet water, and must be steered on until Palm cay comes just open to the southward of Basalt cay, NE. ½ E. The course must then be quickly altered to S. ½ E. to avoid the Cat rock, which lies 300 yards off shore (passing it, however, close aboard by the eye), until Split hill comes just open of fort Aury, SE. ½ E. Now luff up to SE. by S., running parallel with the shore; and when the large

house at Isabel comes in line with fort Aury, anchor in 3 or 3½ fathoms, on sand and grassy bottom, about 300 yards from the shore.

It is to be observed that under Sta. Catalina, which is 460 feet high, the wind baffles about in all directions; and, if thrown at all to leeward, the anchor should be dropped immediately, and the vessel warped in. The Cat rock has only 7 feet water, and the channel abreast it is only 200 yards wide, and the point of Lawrence reef is dangerous. As already stated, the shoals are easily seen in clear weather, and the eye will therefore greatly assist the pilotage. With the wind well to the southward, the sea will be so smooth that a vessel may warp in the whole way.

Vessels drawing not over 10 feet may run out of the harbor with the largest house in Isabel in line with Hill House, until Black point bears E. ½ S. when a W. by N. course will lead out between the shoals to sea. In approaching Old Providence from the southward in the night, it should be kept at a distance. In the daytime it may be neared so as to gain soundings on the southwest end of the bank, with the Spanish saddle hill in line with South hill, NE. by E., in 11 or 12 fathoms; but after it is crossed to the NW. the western edge must be very carefully skirted.

Caution.—There is reported to be generally 2 feet less water in the channels leading to this harbor than is shown on the present charts; the coral banks in the harbor are also said to have grown up.

Tides and current.—The tides are irregular, but there is generally a rise of 6 or 8 inches, and after Northers it is said to amount to 2 feet. There is no perceptible tidal stream. The current in the neighborhood usually runs to the NW., but it is greatly influenced by the prevailing winds.

Roncador bank is a pear-shaped, coral bank, 7 miles in length, northwest and southeast, 2½ miles in breadth at its southeast end, 3½ miles across at the middle part. It terminates almost in a point at its northwestern extremity, on which, about ½ mile from the edge of soundings, in lat. 13° 34′ 30″ N., long. 80° 5′ 39″ W., there is a cay, 600 yards long and 300 yards broad, composed of sand and blocks of broken coral, heaped into a wall on the northeast side, about 7 feet above the sea. On the south end there are some bushes, and three or four dwarf palm trees, which afford shelter to large flocks of birds; there is usually a fisherman's hut at this end.

From the Roncador cay a barrier reef extends to the southeastward, for about 3½ miles, to some dry rocks, whence it curves slightly to the southward to the southeast end of the bank, presenting no opening whatever. At ½ mile from the cay, just within the edge of the reef, there is a small sand bank, and about a mile farther to the southeast there is another similarly situated. There are also two more of these dry ridges, one about ½ mile, the other ¾ of a mile from the southeast end of the bank, which lie NW. and SE. of each other, about 800 yards apart.

The northeast side of the reef is skirted by a bank of soundings about ½ mile broad, with depths varying from 20 to 5 fathoms, over sand and dark coral. At southeast extreme, however, the edge is only ¼ of a mile distant. The west side of the reef is, as usual, filled with detached shoals to the distance of 1¾ miles.

Water may be procured by digging wells near the center of the above cay, but it is very brackish, and only used by the fishermen for culinary purposes.

Anchorage.—On the western edge of the Roncador bank, there is good anchorage, with the usual trade winds, and the dry rocks on the middle of the reef bearing from NE. ½ N. to ESE. ½ E., and Roncador cay, N. by W. ½ W., in 6 or 7 fathoms, avoiding the coral spots, which are easily seen.

Tides and current.—The time of high water at the anchorage is irregular, and greatly depends on the strength of the prevailing wind. It rises about 18 inches, but there is no perceptible stream. The current in the neighborhood generally runs strong to the NW.

Quita Sueño bank lies N. ½ E., 30 miles, from Low cay, at the north end of Old Providence reef, 26 miles from the nearest part of the Mosquito bank, and is extremely dangerous. It is 34 miles long, north and south, about 8 miles broad near the north end, and 13 near the south end, and is so steep that the first casts of the lead may be 14 to 19 fathoms. About a mile within the eastern edge a coral reef, dry in many places, extends along the face of that side, curving outwards a little near the middle, for a distance of 23 miles, leaving a portion of the bank at both ends about 5 miles in extent, with depths from 10 to 17 fathoms, on coral sand. The only break in the reef lies near the middle, where, by chance, a boat might get through in safety. Several large trunks of trees have been drifted on it in several parts, and a spit at the northwest end, lying somewhat sheltered by the reef, seems to be accumulating different substances, so as to render it probable that a cay will be formed there at no very remote period. This spot lies in lat. 14° 29′ N., long. 81° 8′ W.

The space to the westward of the reef, for a distance of 2½ miles, is full of dangerous rocky patches, and abreast the middle part a spit of shallow rocky ground extends off nearly 6 miles, to within 3 miles of the western edge of soundings. Within this part it is not safe even for a boat, for the heavy surf so disturbs the sand at the bottom, that shoals are not easily seen. The bank westward of the shoals is quite clear, with depths from 10 to 17 fathoms, over clear coral sand, which affords good anchorage, the sea being broken by the reef.

Current.—In the month of April, the current was observed to run to the NW. at the rate of ¾ of a mile an hour, but the fishermen remarked that it was unusually strong for that period.

Serrana bank.—The outline of this most dangerous bank is very irregular. It extends about 20 miles in a general NE. and SW. direction; about 7 miles broad near the center, and its southwest end terminates at almost a point. Its extreme east end presents a solid crescent-shaped reef, convex to that quarter, and 5 miles in diameter, upon which the sea breaks with such violence that from the eastward it is sighted before the cays, and may be seen from a distance of 3 or 4 miles. It is so steep-to that, at the distance of ¼ of a mile, no bottom is found at 120 fathoms. On the west side of both horns, there are intricate channels, which might be the means of saving a vessel in a case of extreme danger.

The North channel, situated SW. ½ S., 1¼ miles, from the north point of the reef, is only 100 yards wide, but it has a depth of 7 fathoms, with the advantage of being straight. The space within is crowded with detached shoals, steep-to, having from 5 to 10 fathoms almost alongside them. They are, however, easily seen and avoided. From the west side of the channel, the reef extends in a westerly direction, 4½ miles, when it curves outwards again to the NE. in a semi-circular form, for about 5 miles, forming a dangerous bight.

North cay, situated at the northwest end of this reef, WNW. ½ W., about 8 miles, from the north horn of the east reef, is 300 yards long, and 150 yards broad. It is formed by the broken coral, sand, shells, and drift-wood heaped up on the reef by the violent action of the waves and current, to the height of 3 or 4 feet, upon which there are stunted bushes about 5 feet high. At the north end there is usually a hut; on the west side there is a landing place. There are 12 fathoms about 400 yards from the west side, but there is no safe anchorage, on account of the heavy swell that rolls round the cay. From the cay, the reef trends SW., 3 miles, close upon the edge of soundings. This part is broken, but offers no safe channels, and it only shows itself in northerly winds or heavy trade breezes.

Abreast the end of this reef the edge of the bank is nearly ½ mile off; thence it trends SW. by S., about 12 miles, to the southwestern extremity.

Northwest rocks, situated SW., 3¼ miles, from the above reef, are two small patches of rock and sand, ¾ of a mile apart, and about 2 feet dry, over which the sea breaks in stormy weather. The edge of the bank curves outwards a little here, and there are 14 fathoms ¾ of a mile outside the rocks.

Southwest cay, situated close to the southwestern point of the bank, S. by W., 7 miles, from the nearest of the Northwest rocks, is the largest on the bank, being nearly ½ mile long, east and west, 300 yards broad, and 32 feet high. It is composed entirely of sand, covered with grass and stunted brushwood, and has upon its summit a single

cocoa-nut tree, which may be seen some time before the island. At the southwest end, large masses of broken coral have been thrown upon the beach to the height of 3 or 4 feet.

The cay is entirely surrounded by broken water, and, in rough weather, the only landing is on the north side, through intricate channels near the east end. To the southwestward of this cay, to the distance of 1¼ miles, there are 7 fathoms water, when the depth suddenly and rapidly increases to the tail of the bank, which has not yet been accurately determined; there are 45 fathoms at the distance of about 2¼ miles.

Not far from the east end of the cay, in a dry part of the reef, there is a curious hole or well, similar to those seen at the Bahamas; it is 20 feet in diameter, with perpendicular sides, and 36 feet deep.

The coral ledge extends to only a very short distance from the west end of the cay; but from the east end a barrier reef, dry in places, trends about NE. by E., with a slight inward curve, 9 miles. It is exceedingly steep-to, and being somewhat protected by the windward reefs, it does not show itself at all parts.

Water may be obtained by digging wells at a short distance from the shore.

Guano has for several years been shipped from Southwest cay, by an American company.

Eclipse rock, an isolated coral patch having 2½ fathoms water, steep-to, with 7 to 9 fathoms all around, lies SW. by W. ½ W., ½ mile, from the northwest extreme of Southwest cay. The rock is of a dark green color and not visible until close to.

The eye is the best guide in navigating on Serrana bank, carefully avoiding all discolorations of water, the deep being found over white sand.

Anchorage.—Temporary anchorage in 7 to 9 fathoms, white sand, will be found with the weste xtreme of Southwest cay bearing SSE., at about ¾ of a mile off shore.

The bank of soundings between Southwest cay and North cay should be avoided, as it contains numerous heads of living coral, covered only a few feet, and is unfit for navigation by any vessel except the small turtle schooners which visit the cay.

South cays and channel.—At the east end of the above reef, with North cay bearing N. by W. ¼ W., distant 7½ miles, there is an opening 600 yards wide, distinctly pointed out by three small cays; one lying on each side of it, about ½ mile apart, on an east and west line, the other facing the opening about ¾ of a mile to the northward. The westernmost, named Narrow cay, is a narrow strip of broken pieces of coral, about ¼ of a mile long, east and west; the others are about the same length, and formed of sand covered with grass, neither of them being

more than 3 feet above the sea. The northernmost, named Little cay, is in lat. 14° 21′ 30″ N., long. 80° 15′ 30″ W.

On the edge of the reef, WSW. ½ W., about a mile, from Narrow cay, is a dry sand bank; and about 2½ miles from the cay, in the same direction, there is a ledge of rocks nearly ½ mile long, and 2 feet above water. In the channel between the cays, the depths are 5 to 7 fathoms close to Narrow cay, and to within 300 yards of the South cay; and 4 to 7 fathoms may be carried to the eastward, inside the reef, avoiding the dark coral patches. In the channel to the northwest, between Little and Narrow cays, the depths are only 2½ and 3 fathoms.

Anchorage.—Should a vessel be compelled to enter the above channel, the best anchorage will be in about 4½ fathoms, with Little cay bearing WNW. ½ W., and South cay, SSW. ½ W., the latter about ¾ of a mile distant. In a case of necessity, however, she may bring up just within the entrance, in 7 fathoms, about midway between the cays.

East cay and channel.—From the South cay, a solid reef extends about E. by N., for 3⅓ miles, along the edge of soundings, when it is again broken, and forms, with the southwest horn of the East reef, East cay channel. Near the extremity of the reef, on the west side of this channel, there is a small cay (East cay) of coral blocks and sand, about 3 feet above the surface of the sea, and steep-to. At about ½ mile, NE. ½ N., from it, is a small cluster of dry rocks, and ¾ of a mile to the northward of them a dry sand bank. East cay channel, at the entrance, is about ½ mile wide, and carries from 7 to 10 fathoms, avoiding the coral heads, which are steep-to.

On the eastern part of the bank, fish are most abundant, and seals visit the cays, but not in great numbers. In the turtle season, the bank is visited by small fishing vessels from Jamaica and the neighboring island; and at this period their masts and temporary huts on the cays may be seen before the reefs.

Anchorage.—Should a vessel be compelled to run in through East cay channel for safety, she may anchor just within the hook, in 8 or 9 fathoms, with the East cay bearing about SW. by W., ¾ of a mile distant, taking care to leave room between the shoals for weighing.

Tides.—It is high water, full and change, at 2h., and the rise about 2 feet. On the western part of the bank there is no perceptible stream, but through the channels in the reefs, it runs in and out at the rate of 1½ to 2 knots.

Doubtful bank.—A bank of danger still holds a place on the charts in lat. 14° 53′ N., long. 80° 21′ W., N. by W., 25 miles, from the North cay on the Serrana bank; but nothing was found of it by Her Majesty's surveying vessels, which crossed the spot. Nor has anything been seen by the fishing vessels, which continually traverse this part.

Bajo Nuevo or New Bore, the easternmost of the outlying banks, is oval shaped, about 14 miles in extent, ENE. and WSW., and 4½ miles broad. Its eastern extremity presents a solid semicircular reef, convex to the eastward, dry in some places, and steep-to, the edge of soundings being about ¼ of a mile off. This reef continues along the north and south edges of the bank, for about 4 miles, where a break or opening is formed, about 1½ miles wide, separating it from a similarly formed reef, which extends along the southern edge of the bank, for 7 miles, to a dry sand bank. A shallow ledge, however, with 10 fathoms close-to, projects to the westward of the bank, to within about 2 miles of the southwest end of the bank, which makes this termination, if possible, more dangerous than the other. Small ridges of sand are occasionally formed on other parts of the reef, but they disappear in heavy breezes.

At the west side of the above opening, on the north point of the leeward reef, there is a barren cay composed of sand, broken coral, and drift wood, thrown up by the waves to the height of 5 feet above the sea. It is 300 yards long, and about 50 yards broad, and lies in lat. 15° 52′ 28″ N., long. 78° 39′ 4″ W. At the south end there is a small pond, which is resorted to by seals; and in the months of March and April the bank is visited by fishing vessels, from St. Andrews and Old Providence, for the purpose of taking them.

To the westward of the east reef, the bank is clear for about a mile within the edge; about 2 miles westward of the cay, there is a clear space about 3 miles wide, extending to the southwest end of the bank. The depths vary from 8 to 17 fathoms over coral sand; great care, however, must be taken when standing towards the broken ground on the north side of the leeward reef, and to avoid a coral head which lies W. by S., 2 miles, from the cay. The northern edge of the bank is so steep that the first cast of the lead may probably be 12 or 15 fathoms, the bottom being visible.

Anchorage may be taken up, in moderate weather, in 8 fathoms, with the above cay bearing ESE. ½ E., about 1½ miles distant, but it is quite exposed to the winter breezes.

Current.—Vessels passing eastward of these dangerous reefs should make due allowance for the general set of the current to the westward, at a rate of 1½ to 2 miles an hour.

Serranilla bank.—The south extreme of this bank lies N. by E. ¼ E., 76 miles, from the north cay on the Serrana; its west side is 52 miles from the eastern extreme of the Mosquito bank; and its east side is SW. ¼ S., 65 miles, from the southwest end of the Pedro bank. With the exception of a small bend at its southwest end, it is somewhat circular in shape, being 24 miles long, east and west, and about 20 miles broad in the widest part, north and south.

The west side of the bank, from the southwest extreme, extends about

N. by W., 9 miles, and then NNE., 7 miles. It is everywhere clear, with regular depths from 15 to 9 fathoms, at the distance of 2 miles to the eastward at the south edge, and about 9 miles to the eastward, at the north edge of the bank. At the bend, the edge is composed of fine white sand and shells; elsewhere the bottom is coral sand.

The north side sweeps from the northwest extreme in an easterly direction, curving outwards very slightly, and then gradually to the southward, to the Northeast breaker, which lies ESE. ½ E., 21½ miles, from the northwest point of the bank. For about 9 miles from the west end, this part is quite safe, but to the eastward of this, at only 1½ miles from the northern edge, is a broad coral ledge with very irregular depths from 9 to 5 fathoms, extending to the southeastward as far as the reefs; it would be advisable to avoid this part.

The edge of the bank is everywhere steep-to, the depths increasing very abruptly from 20 fathoms to upwards of 100 fathoms; and at many parts of it the first soundings will probably be no more than 12 or 13 fathoms. In depths of more than 100 fathoms the bottom is very white sand, quite free from all coralline particles, with sometimes a few small broken shells, while on the banks the sand is coarse and mixed with coral. It has upon it three small cays, of the usual character of those described on the adjacent banks, and they are similarly situated to those on the Pedro bank, being confined to the southeast side.

Northeast breaker, situated at the eastern extremity of Serranilla bank, about ½ mile from the edge of soundings, is a dangerous, detached, coral ledge, 300 yards in extent, with a rock awash at its south end, on which the sea breaks heavily. Around it are 8 and 10 fathoms water; 17 fathoms at 600 yards eastward; 12 fathoms at 1 mile southeastward; and 16 fathoms at the same distance northward, over dark bottom.

At about 1¼ miles, W. by S., from Northeast breaker, commences a chain of narrow reefs and shallow ledges, which trends to the southwestward 10 miles. For a space of 1½ to 2 miles outside them, to the edge of soundings, the bank is quite clear, with depths from 13 to 10 fathoms, to within about ½ mile of them.

East cay and reef.—From the northeast extreme of the chain of reefs, a solid reef extends about SSW., with a slight outward sweep, 2½ miles, when it terminates at East cay. About half way on the reef is a small dry sand bank. East cay is about ¼ of a mile long, northeast and southwest, about 100 yards broad, and the dwarf bushes upon it grow to the height of about 7 feet above the sea. About 400 yards from it there are 7 fathoms water, and to the westward of it there is an intricate cut, 700 yards wide.

Middle cay and reef.—At the west side of the above opening there is another small dry sand bank, whence the Middle reef trends about WSW., 1½ miles, to Middle cay. This islet is half-moon shaped, convex to the east; it is ¼ of a mile in diameter, with bushes upon it 7 feet above

the sea. A dry ridge of rocks extends from it, westward, 600 yards; whence a shallow ledge of coral and sand banks trends to the southwest, about 1 mile, having 6 fathoms 600 yards south of it. Between this shallow ledge and the western reef there is an intricate opening 1¼ miles wide.

Beacon cay and reef.—The north end of the western reef lies W.. 2½ miles, from Middle cay, whence it takes nearly a SSW. direction, 4 miles, to Beacon cay, at its southern extremity. The reef, however, is divided into three parts, by shallow cuts about 400 yards wide.

Beacon cay is the largest of the three cays; its shape is that of a quarter moon, convex to the south, and from point to point it is about ½ mile in length. The sand and coral of which it is composed, is covered with samphire grass, and stands 8 feet above the sea; in 1835 a rough beacon of coral stones, 25 feet high, was erected on its west end, in lat. 15° 47′ 45″ N., long. 79° 51′ 27″ W. The bank, from abreast Beacon cay, runs out in a spit which terminates at a point, with the Beacon bearing NE., distant 8 miles. It is quite free of dangers, with regular depths from the 10-fathom line outwards, to 17 fathoms on the end of the tongue. This spit forms the east side of the bend before mentioned. The edge of the bank trends, from the point, about N., 4½ miles, then curves to the westward, for about 6 miles, to the southwest extreme of the bank, W. ½ S., 12 miles, from the Beacon. The fishermen say that indifferent brackish water, strongly impregnated with lime, may be obtained on Beacon cay, by digging wells.

The 10-fathom line of soundings lies within about 600 yards of the SE. side of Beacon cay and its reef; at the same distance to the S. and W., there are 8 to 6 fathoms, and in the former direction the edge of soundings lies 2 miles off.

Anchorage.—The bank to the westward of the islet is quite clear, for a space of about 2 miles, with regular depths of 6 and 7 fathoms, on a clear sandy bottom. Good anchorage will be found here with the usual trade breezes, in 6 fathoms, with the cay bearing about SE., ¾ of a mile distant.

West breaker, nearly at the bottom of the bend, and less than ½ mile from the edge, is a dangerous ledge of rocks, about ¼ of a mile in extent, just above water, with the sea breaking over it; from it the Beacon bears E., distant 8 miles. Around it, on all sides except to the southward, there are 6 fathoms ½ mile off, and the depths gradually increase to 10 fathoms at the distance of about 2 miles to the westward and northward of it. To the eastward, between it and the Beacon shoals, the ground is clear of danger, but the soundings vary from 4½, over dark coral patches, to as much as 9 fathoms, on clear sand.

Northern shoals.—Off the north side of the chain of reefs, from a point lying W. by N., 1¼ miles, from the Northeast breaker, to the dis-

tance of 2½ miles all along them, are numerous coral patches, called Northern shoals, with 1½ to 3 fathoms over them, and 5 or 6 fathoms between, on clear sand. The northernmost lies with Middle cay bearing SSE., and East cay, SE. by E.; the westernmost with the Beacon cay, SE. by S., distant 4 miles.

Tides.—The time of high water at the Serranilla bank is irregular, being influenced by the strength and direction of the prevailing winds. Springs rise about 2 feet. There is no perceptible tidal stream, but in general a current setting to the WNW., from ¼ to 1 mile an hour.

Rosalind bank, called also Arrowsmith bank, the name of the discoverer, lies only 14 miles to the westward of the Serranilla, 30 miles from the northeast part of the Mosquito bank, and 22 miles from the Thunder knoll. It is somewhat oval or pear-shaped, being 63 miles long, from SSE. to NNW., 15 miles broad near its south end, and 35 miles near its north end. The northwest extreme lies in lat. 16° 54′ N., long. 80° 52′ W., and is consequently about 5 miles to the northward of the north extreme of the Mosquito bank. The only shallow ground of any consequence lies at the southeast end. Here, about 1 mile from the edge, a coral ledge, nearly 3 miles broad, trends NNE. from the southeast point, 14 miles, upon which the general depths are from 10 to 6 fathoms, but towards the north part of it there are a few small patches with 4 fathoms water.

At about 13 miles, N. by W., from this ledge there is another of similar character, close to the edge of soundings, which is 8 miles long in the above direction, and 4 broad, but it has not less than 8 fathoms. Elsewhere the depths are from 10 to 20 fathoms, with but little irregularity, over a bottom of coarse coral, sand and shells, which swarms with fish.

Current.—The current generally sets strong over this bank to the northwestward, sometimes at the rate of 1½ knots, and, on striking the southeast end, causes so violent a race over the ledge as to give the appearance of breakers.

A bank, 37 miles long, and with an average width of 10 miles, lies midway between Rosalind and Mosquito banks, with its northern extremity in lat. 16° 32′ N., long. 81° 6′ W.; it lies NNW. and SSE. and has depths of from 33 to 13 fathoms, the latter being at the southern extremity.

Swan islands.—These two islands are situated N. by E., 97 miles, from Patook point, the nearest part of the coast; and lie upon a narrow bank about 10 miles in extent, east and west.

The eastern island is 1½ miles long, and bounded by a bold rocky shore, very difficult of access. The western island is separated from the others by a shallow, coral bar, about 400 yards in extent. This islet is 2 miles long. On its north and west sides are several sandy bays.

Close off its southwest point there is a small rocky cay; and on the north side of the island are several conspicuous cocoa-nut trees, visible from a distance of 12 to 15 miles. Each island is about ½ mile broad, very flat, thickly wooded, and of a uniform height of about 60 feet.

The bank extends from these islands, in an easterly direction, about 2 miles, with depths from 6 to 13 fathoms, but its limits have not been exactly determined. From the north and south sides of the islands it extends about 1 mile; and from the west end 4 miles, in a westerly direction; here the soundings increase from 7 to 40 fathoms.

There is a settlement on the western island, occupied by an American company, named the Pacific Guano Company, having three men in charge of the islands, with stores and implements for working the phosphates, the shipment of which has been discontinued for several years. The islands are said to be covered, in parts, with porous phosphates, the soil excellent, and capable of producing all kinds of tropical fruits; the men grow a large supply of vegetables for their own use. There are ten large tanks on the island, for collecting rain water. The islands abound with duck, teal, pigeons, and turtle.

Anchorage.—Off the sandy bay which forms the west end of the western island, at ½ mile from the shore, there is anchorage in 7 fathoms. It will be necessary, however, to select a clear spot, which is readily done by the eye; and care must be taken not to bring the northwest end of the island to bear eastward of NE. by E.. to avoid foul ground on the northern edge of the bank, upon which there are 4½ fathoms.

Misteriosa bank is about 85 miles to the northward of Swan islands, its northeast point being in lat. 18° 56′ N., long. 83° 41′ W. It is somewhat oval-shaped, 24 miles long in a SW. by W. direction from the above point, and nearly 7 miles broad at the middle. It tapers off to a narrow spit at either end, which, for more than 5 miles from the southwest extreme, is not quite 1½ miles in breadth. The general depths are from 10 to 12 fathoms, over reddish coral, but on the southwest spit there are from 15 to 20 fathoms, and on the middle of the southern edge there is a small ledge of 9 fathoms.

Bank and rock.—Several soundings have been obtained in about latitude 18° 35′ N., with longitudes ranging from 83° 23′ to 84° 5′ W.; and a breaker has been given in lat. 18° 29′ N., long. 83° 18′ W. It is probable that another bank exists southward of the Misteriosa, but the rock is more than doubtful.

CHAPTER X.

COAST OF HONDURAS.—PATOOK RIVER TO CAPE CATOCHE, WITH THE ADJACENT ISLANDS.

It is difficult to define the exact limit of the Mosquito territory. It is, however, remarked that the Mosquito men are not met with to the westward of cape Camaron, and seldom beyond the Patook, although they claim a boundary as far west as the Lammas river. This chapter will therefore include a description of the coast, with the adjacent banks and islands, from Patook point to cape Catoche.

Current.—Outside Bay islands, the main stream runs to the WNW. at its usual rate of ½ mile to 1 mile an hour, until it approaches the Honduras cays and bank. Here it is diverted again to the N. and NNE.; and, when not impeded by Northers, it runs along the eastern shore of Yucatan, with a velocity of 1½ to 2 knots an hour, in the rainy season. Inside the cays south of Belize, it sets to the southward into the bottom of the gulf of Honduras. From thence it turns to the eastward, running along the coast within the limits of soundings, as far as Truxillo, increasing in velocity with the rains. Between Truxillo and cape Gracias á Dios, the stream is very uncertain, both in force and direction.

The coast from Patook point trends W. by N., 45 miles, to cape Camaron, and is all along very low, thickly wooded, and bounded by a sand beach. It curves slightly inwards, and the entrance to Brewer lagoon is 20 miles west of Patook point.

Brewer lagoon.—The opening to this lagoon is at the west end, and on the west side there is a clump of trees much higher than any other on this part of the coast. It is also pointed out by a remarkable piece of elevated land, 250 feet high, which bears from it S. by W. ½ W., 8½ miles. About 7 miles to the eastward there is also a small village of huts. On the bar which extends across there are 6 feet water, but in the rainy season the depth is said to increase to 10 feet.

From the entrance, the lagoon stretches to the eastward, about 12 miles, at a very short distance from the sea, and is about 4 miles broad, except 4 miles from the west end, where a tongue of land stretches out to within 2 miles of the north shore. At 2½ miles, S. by W., from the entrance, are two small islets, which, when seen from the offing, appear as two hills; the southernmost, and largest, is composed of white stone like marble, covered with wood, and is 170 feet high. The depths are from

4 to 8 feet, but there are many shallow oyster banks, and it abounds in fish. Near the southwest end, two small rivers enter the lagoon, the Sinkra on the east side of the tongue of land, the Towas on the west side.

Oorapa lagoon.—At the southeast corner of Brewer lagoon, a small opening leads into another sheet of water, about 3½ miles in extent, named Oorapa lagoon. A branch of the Patook river enters its east end, which is navigable for canoes, but it is said to be dangerously rapid in the rainy season.

North of the entrance of Brewer lagoon, the edge of the bank is about 16 miles distant, whence the depths gradually decrease from 30 to 10 fathoms, at about 2½ miles from the beach.

Mountains of La Cruz.—After passing Patook point, the east end of a vast irregular chain of mountains, called the mountains of La Cruz, comes into view, and this chain skirts the shore as far as the bottom of the gulf of Honduras. At some parts it forms the boundary of the coast, at others receding inland to the distance of 20 miles. Many of the peaks are remarkable and useful objects in the navigation of the coast, and vary from 2,000 to upwards of 8,000 feet in height.

At 17 miles, SW. by W. ½ W., from the entrance of Brewer lagoon, on the meridian of 84° 56′ W., the east end of the range rises almost abruptly from the low land to the Poyas peak, 3,700 feet above the sea, which is most frequently in the clouds. Below it, on the north side, however, is the Sugar loaf, 2,050 feet high, which, being generally visible, is a more useful guide.

Plantain river, with a very dangerous bar, is about 4 miles westward of the entrance of Brewer lagoon. It is said to be navigable for canoes to its source, which is reached in about 5 days. There is a small village on the left bank.

Black river enters the sea about 14 miles farther westward, and 8 miles to the eastward of cape Camaron. It is said to be 120 miles in length, and at a short distance from the sea takes the name of Poyas. On the bar, in the dry season, there are 6 feet water, but the rains scour it out to a depth of 9 feet. It is, however, so exposed that, except in native canoes well handled, it is only passable in moderate weather, during the land wind, or in the lull between the breezes. The opening is readily found by bringing the Sugar loaf mountain to bear S. by W. ½ W.

The river is navigable by canoes for about 60 miles, or 4 days' journey, and the remains of buildings and forts, formerly occupied by woodcutters, may still be seen. The principal settlement is situated on the south side of a lagoon which communicates with the river from the left bank, not far from the entrance. The straggling huts occupy a line of street about a mile long, formerly protected at the east end by a battery

of 12 guns, mounted en barbette. There is also a large lagoon, with a deep channel leading into it from the right bank of the river, navigable for large canoes. In it are several small islands.

Water.—Good water may be obtained a short distance up the river, and firewood in abundance, but time and risk will be saved by employing canoes for the purpose.

Anchorage.—The edge of soundings lies about 11 miles to the northward of the entrance of the Black river, from whence the trees on the shore are just in sight. The depths gradually decrease to the coast, which is everywhere clear, and with the Sugar loaf S. by W., and cape Camaron W. ½ N., anchorage may be taken up in 12 fathoms, on dark mud, about 1½ miles from the bar.

Caution.—The roadstead is completely exposed to the sea breeze, but the holding is good, and, with proper ground tackle, a vessel will ride safely. In the season of Northers, however, it is by no means secure, and, the moment the usual warnings appear, a vessel should proceed to sea before being obliged to slip, which frequently happens. In fact, the ground is strewed with anchors lost in this way, which are apt to be hooked when weighing.

Northers.—The indications of a Norther on this part of the coast are as follows: A short time previous to the change, a heavy swell rolls in from the northward—the wind falls light, and veers to S. and SW.—dark masses of clouds rise rapidly in the western horizon; soon after the wind rushes down suddenly from that quarter, and gradually veers to the northward. So that if a vessel prudently leaves in time, she will be able to gain an offing to the northeastward, ready to return when the wind lulls at the usual quarter. These winds occur between October and February, and during this period the above remarks apply to all anchorages off this coast.

Cape Camaron is a low, rounded, wooded point, the tops of the trees about 80 feet above the sea, and the land flat for some distance within it. At ¾ of a mile eastward of the cape is the entrance of a small stream, with a shallow dangerous bar, named Cape river. The coast from the cape curves to the southwestward for about 14 miles to Little Rock head. About 9 miles from the former, the Poyas river, which is of no importance, empties into the sea.

The edge of the bank lies about 6½ miles northward of the cape, and there are 16 fathoms about a mile from it. The nature of the bottom in the vicinity varies considerably, being composed of transparent gravel, dark sand, mud, and broken shells.

Little Rock head is remarkable as forming a small rocky cliff, the shore elsewhere being sandy; near it will be seen the scattered huts of some Carib Indians, and on the east side of the head a large village.

At the back of the Poyas, and from thence to Great Rock head, the lower ridge of mountains nearly reaches the shore; and S. by E. ½ E., 7 miles, from Little Rock head, a remarkable conical peak rises to the height of 3,150 feet. About 5 miles to the southwestward of the peak is a saddle shaped summit.

Great Rock head.—From Little Rock head, the coast trends W., 12 miles, to Great Rock head, which is a still more remarkable bluff, rocky headland, ½ mile in extent, and about 400 feet high. Between the heads the shore is still sandy and dotted with huts. About a mile eastward of Great Rock head a shoal spit extends 300 yards.

The edge of soundings lies 12 miles north of Great Rock head, when it sweeps outwards, taking a northwest direction, for about 18 miles, to abreast the Romano river, from whence it is distant 16 miles. Here it again runs westerly and comes within about 7 miles of cape Honduras. The bank is quite clear, with depths decreasing from 38 to 12 and 10 fathoms, over sand and mud, at about 3 miles from Romano river; to the westward of this the depths are 20 to 16 fathoms at that distance from the shore, until nearing cape Honduras, when they become irregular; and at 5 or 6 miles northeastward of the cape there are 10 fathoms, coral and gravel.

The coast westward of Great Rock head forms a bight, trending to the SW., for about 4 miles, thence NW. by W. ½ W., 13 miles, to the eastern mouth of the Romano river. From Romano river its trend is about WNW. ½ W., 10 miles, and then W. by N., 9 miles, to cape Honduras; it is all along low, and bounded by a beach, with some small sand-hills here and there, from 40 to 60 feet high, scantily wooded.

The mountain chain, from the head, takes a westerly direction, for about 13 miles, where it appears to terminate rather abrubtly, forming, with the Truxillo range, a valley about 12 miles wide. Near the western extremity of the first range, at about 8 miles inland, S. by E. from the eastern entrance of the Romano river, is a remarkable saddle shaped summit, about 2,500 feet high; the eastern part of it has a rounded form, and is lower than the western, which latter appears broken off, and forms a piece of table-land. To the westward of it is a sugar-loaf peak of much less elevation, which leans to the eastward.

Lammas river.—Near the bottom of the bight, WSW. ½ W., about 5 miles from the head, the Lammas river enters the sea, the entrance of which is made known by a large Carrib village on the east side.

Romano river enters the sea by two mouths, 2 miles apart, and the branches unite about 2½ miles up. Taking its rise in the Sulaco mountains, its length is said to be 120 miles. Its largest tributary is the river Mangualil, celebrated for its auriferous sands and extensive gold washings. In its course it flows past the town of San Jorge Olanchito. On the bar there are from 5 to 7 feet water, and the river is navigable for ca-

noes 80 miles. The east side of the eastern entrance is a distinct sandy point; at about 3 miles, SE. ½ E., from it, and near the beach, is a remarkable piece of land, about 80 feet high, which, when seen from the eastward or westward, has the appearance of a round hill; but from the northward, the western part shows a flattened summit, with a sugar-loaf hill at the east end, and a chasm between.

Truxillo bay.—Cape Honduras, or Castilla point, is the extremity of a narrow neck of low land, about 4 miles in length, bounding the north side of Truxillo bay. From the inner part, the shore curves to the southward and round to the westward, forming between the cape and Camaron point, which is SW. ½ S., 10 miles, from it, a bight 8 miles deep. At about 6 miles, S. by W., from the cape, and about ½ mile from the shore, is a small, white, sandy shoal, named St. Luke, or Sand islet, just awash, which, lying under very high land, is not easily seen; it is, however, clear, and within it there is a channel with 4 to 5 fathoms.

Caution.—The depth of water in this bay is reported to be considerably less than that shown on the present charts. In 1880 the U. S. S. *Kearsarge* shoaled the water gradually from 10 fathoms, about 2 miles from the settlement, to 6 fathoms, within 1 mile of the town.

At the east end of the bay a channel leads into a spacious lagoon, which forms a good boat harbor; and at the northeast corner of the bay a small bight affords shelter, during Northers, for coasters. To the southward of the lagoon commences the town, which is scattered along the shore to a considerable distance, and defended by a small fort at the east end. Immediately behind it the great mountain chain rises to the peak of Guaimoreto, 3,200 feet high; and to the look-out hill, 2,500 feet above the sea, at the northeast end of the ridge. The former bears SSE. ½ E. from the cape, and both are useful guides to the bay.

No account of the number of its inhabitants can be given, many of whom are Caribs, who reside at the west end of the bay; but it has a considerable commerce. The chief exports are hides, mahogany, dye-woods, sarsaparilla, and cattle; the imports, dry goods, rum, and flour. Beef and vegetables can be procured in abundance.

Water.—A small stream, named the Cristales river, enters the bay near the town, which supplies good water. The casks may be rafted, and rolled over a narrow neck of land, or filled in the boats by buckets.

Anchorage, with the usual breezes, may be conveniently taken up in about 6 fathoms, a mile from the shore, abreast the river, with the cape bearing NNW.; but it is not safe in Northers.

Caution.—The bay is clear, and the cape may be passed within 200 yards; at the distance of ¼ of a mile there are 30 fathoms water. In the outer part, the depths are irregular, from 25 to 10 fathoms, but, within the last line, they gradually decrease to the shore. In standing to-

wards St. Luke island, a vessel should not shoal to a less depth than 5 fathoms.

Leopard bank.—In working up from the westward, great care must be taken to avoid a sand-bank on which H. M. S. *Leopard* grounded in June 1858. The bank lies with point Camaron bearing SSW., and cape Honduras NE.; but as these bearings were taken from a boat, the exact position of the bank is doubtful.

Light.—Truxillo lighthouse having been destroyed by a hurricane in 1875, a temporary light, visible only 4 miles, is exhibited, but it is not to be depended on.

Niobe shoal, small in extent, and having over it a depth of 66 fathoms, lies N. by E., 20 miles, from cape Camaron.

Bonacca island.—The nearest point of this island lies N. by E., 23 miles, from cape Honduras; it is at the southwest extreme of an oval-shaped bank of coral and sand, 14¼ miles long, northeast and southwest, and 6 miles in breadth at the middle. The island itself is 8½ miles long in the same direction; at the middle, it is 3 miles broad, whence it gradually tapers to a bluff headland at the southwest end; but the shores of the northern part are irregular and indented. It is composed of a mass of rugged, densely wooded hills, which rise from 300 feet at the extremities to 1,200 feet in the centre, the upper parts being covered with pine ridges, through which are seen occasional bare spots of pale granite. The woods are overrun with wild hogs. The population numbers about 350, living chiefly on the cays, to avoid the numerous flies on the island. The northeast end of the island is a bold peninsula, about 1 mile broad, and 1½ miles long, east and west, which terminates at some remarkable cliffs, 100 feet high, of a yellow ochre color. From it the bank stretches out to the northeastward, 5 miles, carrying depths from 8 fathoms, at the distance of only ½ mile from the shore, to 14 fathoms, on the edge of soundings. The southeast side of Bonacca is skirted with dangers, at some parts, to within a very short distance of the edge of, the bank, which is from 2 to 2½ miles distant. From the east end of the peninsula, a dry reef trends about SSW., 3 miles, with a slight curve outwards; and upon the edge of it are ten small, low cays, covered with palm and other trees to the height of from 40 to 70 feet above the sea.

The southwest end terminates at a bluff headland, 100 feet high, composed of a similar ocher-colored cliff to that at the opposite extreme of the island. Foul ground extends from it a mile, with depths of only 2½ to 4 fathoms to within ¼ of a mile of the edge of soundings; it must, therefore, be approached with very great care. The northwest side of the island is also extremely dangerous, being fringed with coral shoals to the distance of a mile in some parts, and close to the edge of the bank. It is so well watered, that, during the rains, little streams descend from the heights, through most of the valleys on either side of the island.

Half-moon cay, the southernmost and largest, is ¼ of a mile long and 200 yards broad, and lies ⅜ of a mile from the shore. Commencing from the northward, the islets are numbered on the chart from I to XII; the two last, however, with several more similar, lie between Half-moon cay and the shore. Inside the reef there is anchoring ground, ½ mile in width, with depths from 6 to 11 fathoms, which may, with local knowledge, be entered by either of two channels.

The first opening lies between the first and second cays, and carries 6 to 14 fathoms on a W. ½ N. line. The channel lies close to the first cay, but it is only 60 yards wide, and the swell is so heavy as to render it extremely dangerous to a stranger. The other cut lies between Half-moon cay and cay IX, which are about 200 yards apart, and steep-to. The depths are here from 9 to 16 fathoms on a WNW. course, which will have to be gradually altered to NNE. ½ E., into the anchorage abreast cay V. Detached shoals lie in the way within both channels; but the pilotage is easily conducted by the eye from aloft. They are of course too narrow to work out of, and a vessel will have to thread her way to sea between the southern ledges and Southwest cay, or to the southward of Half-moon cay.

Sheen cay anchorages.—To the westward of Half-moon cay, the space is nearly filled with cays and ledges, steep-to; and between them are two more channels, equally deep, leading into snug anchorages, somewhat more easy of access.

The first passage between cay XII and Pond cay is about 400 yards wide, close to the westward of the former, and may be entered from the eastward or southward. If entering from the eastward, pass the southwest end of Half-moon at the distance of about 300 yards, and from thence steer W. for cay XII, keeping it about half a point on the starboard bow. After rounding this cay gradually, at the distance of about 100 yards, with tree peak seen just open westward of a dry sand bank close to the shore, N. ½ W., anchor 400 yards to the northward of it.

To enter from the southward, steer in with Dunbar rock, which lies a little eastward of the dry sand bank, seen just open westward of cay XII, N., and round the latter as above directed. Observe, however, that the sand bank is very difficult to make out.

Pond cay channel is about 300 yards wide, and is best entered from the eastward. In this case, leaving the southwest end of Half-moon at the same distance as before, steer about W. ½ S., keeping Pond cay about a point on the starboard bow. The borders of the dry reefs forming the channel will be easily seen, and passing midway between them, anchor as soon as shelter is obtained by the reef which extends southwestward from Pond cay. Vessels must run out by threading their way between the reefs and ledges to the southward.

Water.—The first of these anchorages is the most convenient spot for large vessels to water; for they can sail in and out with the usual

breezes without much risk. The rivulet will be found by bringing the southwest end of Half-moon just open to the southward of cay XI.

Swift ridge.—The only danger of importance, in the approach to the above channels, is a narrow ledge of coral, a little more than a mile in length, northeast and southwest, the middle of which is not ½ mile from the edge of soundings. Near the southwest extreme are two patches, nearly connected, occupying a space of about ½ mile, with only 9 feet water, which break in heavy weather, and are easily seen from aloft when they do not. From this end of the ridge, Southwest cay bears SW. ¼ W., ¾ of a mile; and the leading mark for the south channel passes about 200 yards westward of it. From the east end of the patches the highest peak bears NNW. ½ W. To the eastward of this line the depths on it are 3½ to 4 fathoms; and the northeast end of the ridge terminates with the highest peak in line with the west side of cay XI, NW. ¾ N., and the east end of Half-moon cay N. by E., about ¾ of a mile distant.

Southwest cay lies only 400 yards within the edge of the bank; it is 600 yards long, but very narrow, and the trees upon it are about 50 feet above the sea. A rocky bar extends from it to the eastward, 1 mile, with depths of 4 to 6 fathoms; and to the westward of the cay there are several shoal patches, with 3 to 5 fathoms, making the soundings extremely irregular and alarming, varying suddenly from the latter depths to 20 fathoms.

Anchorage.—During Northers, however, smooth anchorage will be found on this part of the bank, with the southwest end of Bonacca bearing about W. by N., and Southwest cay, NE. by E. ½ E.

Michael Rock channel, the only opening that might be used in a case of need on the northwest side, lies nearly abreast the middle of the coast, with the highest peak bearing SE. by S.; it is about 300 yards wide, and quite straight upon the above line, carrying irregular depths from 6 to even 30 fathoms water. Within it, to the southward, there is a little basin about 600 yards in extent; but there are several rocky heads in the way.

Light.—There is a *fixed white* light shown from a *mast* on cay XII, which is visible from a distance of 6 miles. Position: Latitude 16° 26′ 30″ N., longitude 85° 53′ 40″ W.

The tides are much influenced by the winds; but in calm weather it is high water, full and change, at 9 hours, and the rise is about 1½ feet.

Roatan island, situated 14 miles westward of Bonacca island, is 27 miles long, ENE. and WSW., with an average breadth of 2 miles; about 3 miles from the eastern extreme there is a very narrow canoe channel, not visible from the sea; and this small portion, about 1 mile broad, is named Helena island. The general height of Roatan island is from 300 to 500 feet; but about 7 miles from the east end, Barra hill rises to the

height of 735 feet, and guides to Port Royal; and about the same distance from the west end of the island, another summit reaches an elevation of 800 feet, pointing out Coxen road. It is everywhere densely wooded and well watered. Cocoanuts, bananas, and plantains are exported in large quantities. The island belongs to Honduras, and the population numbers about 3,500.

About ¼ of a mile eastward of Helena island is a small cay, ½ mile in diameter, named Murat. A mile farther east is Borburata island, which is very narrow, but nearly 3 miles long, east and west, and at its eastern end about 500 feet high.

The north side of Roatan presents no indentation whatever; and the whole of it, and the same sides of the eastern islets, are skirted by a reef at a distance of about ½ mile. From Borburata, it curves to the eastward, forming a half-moon face, which reaches off in that and a southeast direction, 2 miles, when it inclines to the westward, and passes close to the south end of Helena island. Between the outer extreme of the Half-moon reef and the shoals off the southwest end of Bonacca, the channel is about 6½ miles wide.

At 1½ miles southward of Borburata, on the edge of the reef, are two small cays, between which is an opening leading into a clear sheet of water, inside the reef. From the south point of Helena, the reef still skirts the shore, at ½ mile, for a distance of 4 miles; where it is connected to the cays which form Port Royal harbor.

Port Royal harbor.—George cay, the largest of the above islets, lies about ½ mile from the shore, and the northwest point is in lat. 16° 24′ 20″ N., long. 86° 19′ 14″ W. It is nearly ¼ mile in length, east and west, and about 200 yards broad, low and wooded, and at its west end there are the ruins of a fort. The reef connects the east end to the shore near a very small islet, and, thence skirting the south and west sides at the distance of about 300 yards, comes close home to the north point of the cay.

To the westward of George cay, a narrow ledge nearly dry, named Long reef, trends to the westward ¾ of a mile. Between the east end of this reef and the George cay reef is a channel about 200 yards wide, carrying 10 to 13 fathoms in a NW. direction; and between the west end of Long reef and the reefs which skirt three more small cays, there is an intricate opening, about 100 yards wide, with similar depths, in a NNE. direction. Port Royal harbor, lying between the reefs and the shore, is about 1¼ miles long, east and west, and from ¼ to ½ mile wide, with depths from 5 to 10 fathoms, over sand. There are two small patches of 3 fathoms at about 400 yards from the northwest shore; but in several parts, the coast is so bold and well sheltered that a vessel of large draught may discharge or careen alongside it.

Water.—Several small rivulets run into the northwest corner of the harbor, convenient for watering; and wood is in abundance.

Directions for Port Royal harbor.—The position of this harbor is pointed out from the offing by Barra or port Royal hill, before mentioned. The eastern channel is alone safely navigable for large vessels; being, however, so very narrow, it requires a leading wind, which the usual trade breezes afford. Still it is so short, that, with a scant wind, by hugging the east side close aboard, a vessel may shoot through into anchorage, and warp up. The borders of the reefs are steep-to and easily seen.

The most convenient berth for watering is with the northwest end of George cay bearing about SE. ½ S., and Cossack cay just open to the southward of Cow and Calf cays, in 6 fathoms; but to discharge or refit it will be better to warp up to the east end.

A vessel may run out through the western channel, guided by the eye; but it is very intricate, and there are patches of 3 fathoms water, which it is scarcely possible to avoid.

Oak Ridge harbor, so named from the numerous oak trees on either side of it, is situated about 4 miles west of George cay. On the bar there is a depth of 12 feet, and 2 to 5 fathoms within the harbor, which is very narrow, and the shores are steep-to. The channel leading over the bar is marked by small stakes.

Falmouth cove.—The shore for about 13 miles westward of port Royal, to Dixon cove, is clear and bold. At 5 miles from George cay is a small inlet, named Falmouth cove, but the anchorage is exposed.

Dixon cove is situated on the west side of the second prominent point westward of port Royal, and is protected from the southward by a broken reef, upon which are three small cays. The channel lies between the two easternmost cays, and is clearly pointed out by the edges of the reefs on either side, which are steep-to; it lies north and south, and carries 15 and 20 fathoms water into the anchorage, in the middle of the cove, abreast a small creek at the east end. The shores are quite bold, with 3 fathoms at half a ship's length, and at the bottom is clay and mud, so that a vessel having lost her anchors, may run upon the ground at the northeast end of the cove. The space is so confined that it will be necessary to moor with a kedge.

Coxen hole.—About 2½ miles westward of Dixon cove, abreast the highest peak in the island, and 200 yards from the shore, is Coxen cay, which is nearly ¼ of a mile long, 200 yards broad, and 75 feet high; on the east side of the south extreme are some huts. From the east side, a solid reef connects the cay to the shore, and shelters a small cove, called Coxen hole, adapted for vessels drawing 8 feet water. On the west side of Niobe point, the north entrance point of this cove, there is a straggling town, containing a population of about 1,000 inhabitants. Carib point, on which stands a church, is situated about ½ mile west of Niobe point, and may be recognized by the high cocoa-nut trees on its extremity.

The reef skirts the south end of Coxen cay at a distance of about 300 yards, and thence gradually nears the northwest extreme of the cay, leaving a channel into the cove on either side of Blaney cay. A red buoy is moored on the west edge of this reef.

From Carib point, the shore curves to the westward and southwestward, to some dark cliffs, about 20 feet high, forming a bay 1 mile wide and ¼ of a mile deep. The shore is bold and steep, and in the middle of the bight there are 35 fathoms water. The shore, from the dark cliffs to the southwest end of Roatan, 5 miles distant, and thence for about 2½ miles, to the northwest extreme of the island, is clear and steep-to. From the southwest point, the northeast end of Utilla island bears SW. by W., 16 miles; and the edge of the mainland bank is 13 miles distant.

Seal bank, situated about 800 yards southwestward of Coxen cay, is ¼ of a mile long, east and west, and 300 yards broad. Near the middle, with the dark cliffs bearing W. ½ S., it is nearly awash; and the depths elsewhere are only 2 and 2½ fathoms. The huts on the southeast side of Coxen cay bearing NE. by E. ¼ E. clear its northwest side; the east extreme of that cay, NNE. ½ E., clears the east end; and a remarkable small peak (Hendricks hill), 300 feet high, close to the shore at the western base of the highest peak, N. by E., clears the west end. The channel between the bank and the foul ground off Coxen cay reef is 300 yards wide, and carries 5 to 18 fathoms.

Smith bank, situated S. by W., 1 mile, from Coxen cay, and SE. by E. ½ E., the same distance, from the dark cliffs, is composed of coral, 800 yards long, east and west, and 300 yards broad, with depths of 3 to 4 fathoms. Hendricks hill bearing N. by W. leads east, and bearing N. by E. leads west of Smith bank. Between it and the Seal bank the depths vary from 12 to 40 fathoms.

Daring bank.—About 2½ miles eastward of Coxen cay, nearly abreast Dixon cove, lies a detached bank on which H. M. S. *Daring* struck; with the cay bearing WNW. there are 2½ fathoms, and 6 fathoms between it and the shore. It is said to extend to the southward of the above position, and probably joins the Cordelia shoal, by a narrow ridge of less than 10 fathoms.

Cordelia shoal lies 1 mile, ESE. ½ E., from Coxen cay, and ¾ of a mile off shore; it has but 4 feet on it, with a bank under 10 fathoms around.

Shoals.—H. M. S. *Druid*, 1882, when proceeding for Coxen road from the eastward, passed over a shoal (sand and coral), about 1 mile long, east and west, and ½ mile broad, on which the least water obtained was 3 fathoms, with the church on Carib point bearing NW., distant about 2 miles; from the east end, in 12 fathoms, the church bore NW. by W., 2 miles, and from the west end, in 12 fathoms, NNW. ½ W., 1¾ miles.

A rock, with 9 feet on it, is supposed to lie 5 miles south from Dixon cove, but its position is not correctly ascertained.

Anchorage.—The best anchorage, for small vessels, will be found in 12 to 14 fathoms, with the southwest extreme of Coxen cay bearing SE. ¼ E., and Carib point W. by N. Farther out the water is too deep, and a vessel will lie so exposed as to be scarcely safe, even with the usual trade breezes.

Supplies.—Beef may be obtained at a moderate price, also a small quantity of vegetables and poultry. Water can be procured from a river ½ mile west of Carib point.

Light.—From a light-house 15 feet high, situated on a hill westward of Government houses, a *fixed white* light is exhibited at an elevation of 85 feet above the sea, visible from a distance of 4 miles.

Buoys.—A buoy marks the south end of a rocky patch lying nearly in the fairway. Vessels, working to windward, must not approach the buoy nearer than 20 yards, and never pass to the northward of it. A reef makes out to the westward from Coxen cay, the extremity of which is marked by a buoy. A buoy marks the western edge of Seal bank.

Caution.—The buoys are not to be depended on, as the two latter were not in position at the time of the *Kearsarge's* visit to Roatan island (1880), and, according to reports of natives, are not generally to be depended on as being in place; and, even when in position, they are difficult to find, as they are simply logs moored and floating on the water.

Directions for Coxen road.—Vessels may enter the roadstead by the channel between Coxen cay and Seal bank, which may be done by the eye, or they may go to the westward of the outer banks. From the uncertainty, however, in the positions of the dangerous banks which lie to the southward and eastward, it will be necessary to approach this part of the island with great care, until in the fairway of the western channel; steer with the church in line with Hendricks hill, bearing about N. by E. ¾ E., which leads westward of all the shoals, and when old Government house is in line with Blaney cay, bearing NE. by E. ¼ E., the anchorage may be steered for. At night the light near the governor's house, bearing NE. ½ N., will lead into Coxen road, clear of all dangers.

In approaching the western passage from the southward, Hendricks hill must not be brought to the northward of N. by E., before the huts on the southeast side of Coxen cay bear NE. by E. ¼ E., to avoid the Seal and Smith banks. Should it be necessary to make a board to the southward, care must be taken not to cross the former line, when outside the Seal bank.

The coast from Camaron point trends WSW., about 7 miles, and is quite clear. Thence it curves to the SW., 2½ miles, to Quemada or Rocky point, upon which are some huts. Abreast the latter space a narrow spit of hard sand extends, in a westerly direction, 8 miles from the land, with depths from 3½ to 6 fathoms, over which there is generally a very heavy swell.

Quemada bight.—The coast from Rocky point still curves to the southwest and westward, for about 13 miles, to the point and river Catchabutan, forming the bight of Quemada. It is all along clear, but, from the last point, foul ground extends to the northward upwards of a mile; and the soundings from thence are irregular, and vary from 5 to 20 fathoms out to the Hog islands.

Anchorage.—To the southward of the hard spit the depths are 8 to 10 fathoms, and they gradually decrease to the shore, offering good temporary anchorage. The bight is known as the resort of vast numbers of turtle and manati.

Hog islands lie 8½ miles from the shore, on the meridian of Catchabutan point, W. ½ S., 28 miles, from cape Honduras, and 5 miles from the edge of soundings. The northeast island, which is the largest, is 1½ miles long, north and south, ½ mile broad, 430 feet high, and densely wooded. The north side of it is steep-to; there are 23 fathoms at the distance of ½ mile; but from the east side a spit of coral extends in that direction 1½ miles, with depths from 4 to 6 fathoms. At a short distance from the south side of the island is a cluster of small cays and rocks, lying close together.

At ½ mile to the westward of the above lies the next island in size, which is about ½ mile in diameter, and rises to a conical, wooded peak, 500 feet above the sea. The channel between these two islands has 14 to 16 fathoms.

From the western islet a coral ledge extends SW., 2 miles, upon which are many small cays and dry sand banks. With the above peak NE. ½ E., distant 3 miles, there is a small detached shallow patch, called the Providence shoal. These cays require to be approached very cautiously.

Water.—In a little cove on the west side of the northeast island there are wells of good water.

Anchorage.—With the usual breezes, temporary anchorage may be obtained in 6 or 7 fathoms, close under shelter of the northwest end of the northeast island, but a clear sandy spot must be chosen.

The coast from Catchabutan point trends W. ¾ S., 17½ miles, to Congrehoy point and river, and thence with a slight bend W. ½ N., 33 miles, to Bishop and Clerks head. It is all along low and woody, the tops of the trees from 50 to 80 feet above the sea, and bounded by a sandy beach. Several unimportant streams empty on this part of the coast, and in the rainy season their muddy waters discolor the sea to a considerable distance. The shore is clear and bold, with depths of 10 and 12 fathoms, over sand and mud, at a distance of about 2 miles, with the exception, however, of the space between the shore and the Salmedina shoal, 16 miles to the westward of Congrehoy point. Here, for about 5 miles, the coast is skirted by a ledge at the distance of a mile; and outside this

the soundings are very irregular, shoaling suddenly from 17 to 5 fathoms.

Congrehoy mountains.—At a short distance to the eastward of Congrehoy point, not far inland, the great mountain chain rises abruptly to the height of 5,400 feet; and SSW. ½ W., 10 miles, from Congrehoy point, its loftiest summit, a conical peak of that name, is 8,040 feet above the sea. Viewed from the NE., this peak rises above the neighboring heights to a well-defined sharp cone; but from the NW., a small flat shoulder is seen to project a short distance to the eastward, a little below the summit. On the meridian of Bishop and Clerks head, about 25 miles inland, these mountains form a sharp elbow, and, turning to the southeastward, connect with the Sulaco range. The extensive low, densely wooded flat which lies between their base and that of the Omoa mountains, 30 miles to the westward, is named the plain of Sula.

Salmedina shoal, situated 8½ miles from the coast, and NW. by W. ¾ W., 16 miles, from point Congrehoy, is a dangerous coral bank, nearly 1½ miles long, ENE. and WSW., and ½ mile broad; near the east end it breaks in any swell, there being only 2 feet water, from which Congrehoy peak bears SE. by S., and Utilla peak, NE. ½ N. There are 10 fathoms close around the edges of the bank, but SE., about a mile, from it, there is a patch of 4 fathoms water.

Utilla island, situated on the edge of the bank, 20 miles from the coast, on the meridian of the Congrehoy peak, is 8 miles long, ENE. and WSW., and 2 miles broad. A narrow ridge of hills extends across the east end, and at the northeast extreme a conical hill rises from the shore to the height of 290 feet; elsewhere it is only from 60 to 70 feet high, and cut up by swamps. The dense woods with which it is covered are overrun with wild hogs, and the mosquitoes are insufferable.

The north shore is bold, the soundings not reaching more than ¼ of a mile off, and it affords no shelter whatever. There are two small bays, protected by reefs, but they are only available for coasters. The east end is equally clear; there are 20 to 30 fathoms at only ¼ of a mile; and the edge of the bank is ¾ of a mile from the northeast extreme of the island.

There are about 200 residents on this island, employed chiefly in the cultivation of fruit, of which a large quantity is exported to New Orleans. Utilla was visited in 1877 by a hurricane, which destroyed a large amount of property.

East harbor.—The southern part of the east end of the island is composed of black and red cliffs, about 20 feet high. At ½ mile westward of them the low mangrove shore, receding to the northward, forms a bay nearly 1 mile wide and ½ mile deep, named East harbor. From the east point of it a coral reef and shallow ledge extend westward, nearly ½ mile; and another curves to the eastward 600 yards from the western shore,

which so shelter the bay as to make it a safe harbor for two or three vessels of moderate size.

The channel is 300 yards wide, and carries 5 to 6 fathoms water to the middle of the bay, whence the depths decrease to 4 fathoms at about 400 yards from the north shore. It lies north and south, and must be navigated by the eye, taking care to avoid two small coral heads which lie 600 yards from the east shore, easily seen from aloft.

The most convenient anchorage is with South cay just shut in with the western shore, SW. by W. ½ W., and the east point SE. ½ S., in 5 fathoms, muddy bottom. A vessel will sail in and out with the usual breezes, but with northerly winds she will have to warp in.

There is a well of good water on the north shore of the bay, near a path that leads across the island.

Light.—There is a small wooden light-house off East reef, showing a *fixed white* light visible from a distance of 4 to 5 miles, but the light is not to be depended upon.

Southwest cays.—From East harbor the shore trends WSW., about 3 miles, to the south extreme of the island; it is quite clear, and there are 16 fathoms water within almost 200 yards. Abreast the latter point the ground becomes exceedingly foul, and a cluster of eight small, low, wooded cays extends from the shore, on a WSW. line, for 1½ miles, the innermost lying about 400 yards from the beach; the next cay to the southward, named Sucsuc, is inhabited.

The openings between third, fourth, and fifth cays, and between Water and South cays, are narrow and tortuous, being only useful to the fishermen who resort to the island in the turtle season.

Salmedina rocks, situated SSW., 1 mile, from the South cay, are three very small, flat, barren rocks, 4 feet high, lying close together, from which the Utilla peak bears NE. ½ E. A shallow ledge extends from them in a northeasterly direction nearly ½ mile. About the same distance NNW. is a coral bank, ¼ of a mile in extent, with only 9 feet water; and to the southeast and southward, within 1 mile of the rocks, are foul patches with 3½ and 5½ fathoms. A vessel approaching these rocks and cays from the southward or eastward, should not bring the Utilla peak to bear eastward of NE. ½ N.

Western cays.—Northwestward of the southwest cays are three similar cays, covered with bushes and cocoanut trees, named Ragged, Middle, and West cays. The first lies ½ mile from the west end of Utilla, and there is no passage between; the second is 1 mile farther to the southward; and West cay is WSW. ½ W., ¾ of a mile, from the latter. Between them the ground is everywhere shallow and foul to near the edge of soundings, which lies 1¼ miles to the westward of West cay.

South ledges.—To the southward of West cay, 1 mile from the edge of the bank, lies a coral ledge, 1 mile long, north and south, and 600

yards broad, nearly dry. From the south end West cay bears NNE., distant 2½ miles, and the Salmedina rocks ENE. ½ E., the same distance. To the eastward of it, as far as a mile, there are other ledges with depths of 2¾ and 3½ fathoms; the farthest lying with Ragged cay just open to the westward of Middle cay, N. by E. ¼ E., and the Salmedina rocks ENE. ½ E. The latter rocks bearing NE. by E. ½ E. lead over the outer or south end of these ledges, in 4½ fathoms, which has 23 fathoms close to it.

Anchorage.—Between the easternmost of the above ledge and the Salmedina rocks there is a clear space more than 1 mile wide, as far to the northward as Middle cay, which, being protected on the east by the southwest cays, and to the north and west by the cays and ledges in that quarter, affords good sheltered anchorage. It is open to the south, but those winds seldom blow hard. The depths are regular, and decrease gradually towards the shore, from 25 to 16 fathoms over sand and coral. This is a very convenient place for wooding; and with the assistance of a fisherman to pilot, a vessel may go so far in as to bring West and Middle cays in line, and the west end of Utilla N. by W. ½ W., about ½ mile distant, where she will have 10 fathoms. The reefs and shoals abound in fish and turtle.

Directions for anchorage off Salmedina rocks.—A vessel approaching the above anchorage from the eastward, should steer to pass at least 1 mile to the southward of the Salmedina, and until Ragged cay is in line with the east end of Middle cay, bearing N. ¼ E. This mark, or Ragged cay seen just open eastward of Middle cay, bearing N. ¼ W., leads in; and when South cay bears E., steer to the eastward, and anchor in about 10 to 12 fathoms, with Middle cay WNW., and the west end of Utilla N. ¼ W. In working up from the westward, when standing towards the southern ledges, care must be taken not to bring the Salmedina rocks to the eastward of NE. by E., before Ragged and Middle cays are in line, bearing N. ½ E.

Bishop and Clerks.—To resume the description of the coast, Bishop and Clerks head is a bluff rocky headland; and close off it lies a cluster of little rocks about 20 feet high, which are so steep-to that there are 20 fathoms water at less than ½ mile from them.

The coast from the head curves suddenly to the southwest, for 3½ miles, to a similar bold projection, named cape Triunfo; thence it turns sharply to the southward, for about 1½ miles, when it assumes a northwesterly direction, for 12 miles, to Sal point. It is all along low and sandy, but backed by the lofty mountain ridge extending westerly, which, only 8 miles south from Bishops head, rises abruptly to a height of 2,400 feet. About 7 miles to the westward of cape Triunfo is the entrance to an extensive lagoon, named Sarsaparilla, which is navigable for canoes.

Anchorage.—The large bight formed between Bishop and Clerks head and Sal point, is everywhere clear and bold; and with cape Tri-

unfo E. ½ S., about 1 mile distant, there is anchorage in 12 fathoms. It must be left, however, immediately on the approach of a Norther.

At 2 miles, SSW. ½ W., from the cape, a river empties, which has a small settlement on its banks, where cattle may be obtained.

Sal point is a bold rocky promontory, about 2 miles in extent, east and west, crowned by irregular hills of considerable height, which, lying in front of the plain of Sula, appears like an island at first sight, and until within a short distance from it. About ½ mile from the east extreme are three or four rocks similar, but much higher, than those off Bishop and Clerks head. Between them and the point there is said to be a channel for coasters; and at 1 mile to the northward of them there are 12 fathoms water.

On the meridian of the Sal rocks the edge of soundings is about 6 miles distant, and is so steep that the depth increases suddenly from 23 fathoms to no bottom with 100 fathoms. Between this point and Utilla the outer limits of the bank are very irregular, and form two deep curves. The soundings are also variable, with several patches of 7 fathoms. About N. by W., 11 miles, from Bishop and Clerks head, there is a detached bank, about 5 miles in extent, with depths of 22 and 27 fathoms. To the westward of Sal point the edge curves suddenly to the southward, and passes within 1 mile of the Ulloa river, but the bank to the westward of Utilla island and the Salmedina shoal has not been very minutely examined.

Sal coves.—On the west side of the Sal promontory are two coves, separated by a high bluff, which are said to be available for coasters. In front of them, about ½ mile from the shore, there is good anchorage in moderate weather, in 8 fathoms, muddy bottom. Farther out the ground is rocky. Sal river flows into the head of the bight, a little to the southward of the coves, and 2 miles from the promontory. Thence a low, sandy shore trends NW. ½ W., 4 miles, to a well defined sandy point at the east side of the Ulloa river.

Ulloa river is of considerable size, and its muddy waters discolor the sea to some distance. It takes its rise to the southward of Comayagua, one of the principal towns in Honduras, which is about 100 miles in a direct line from the sea. Its bar is reported to have, at times, 9 feet water on it, but generally 7 feet. Its principal tributaries are the Santiago, from the left bank, about 35 miles from the mouth; the Blanco, from the same side, a short distance further on; and the Sulaco, from the opposite bank, about 30 miles higher up. It is also said to be navigable for light-draught river steam vessels as far up as the Blanco branch, and when swollen, in the rainy season, to the Sulaco. Above the Blanco it is named Humuya. It may be said to be impassable for sailing vessels, as the outset is so strong that a fresh breeze is required to enable them to stem the current, and with such a breeze the sea on the bar is very heavy. At any time between March and December, ships may

anchor and load off the mouth of the river. There is, however, a cove about 1 mile to the westward of the mouth of the river, where a landing may be better effected, and at all times, except during a Norther. From this landing to the river, the distance is less than 300 yards. The shore in the vicinity of the mouth of the Ulloa is very steep, and, after Northers, the easterly current runs close home to it with great strength.

The Coast.—From the Ulloa, the sandy beach trends WSW. ½ W., 5 miles, to Chimlico or Chamalacon point and river, thence WSW., 9½ miles, to Caballos point. The locality of the entrance of the Chimlico is pointed out by a very remarkable, isolated, conical hill, 636 feet high, which rises close to the shore about 2 miles to the westward of it. The coast elsewhere is all along low and woody, but backed at a short distance by the Omoa mountains.

To the westward of the hill foul ground appears to extend about 2½ to 3 miles. At the distance of upwards of a mile from the beach, the hill bearing about SE. ½ S., there are only 3 fathoms water.

Caballos point is the extremity of a low, narrow neck of wooded land which forms the north side of a bay, about 3 miles wide and 2 miles deep, named port Cortez, formerly Puerto Caballos. At the head of this bight is the entrance to Alvarado lagoon, which is oval-shaped, about 2½ miles long, east and west, and 1¼ miles wide. In the middle it has a depth of 10 fathoms, whence it gradually shoals to the shore; the narrow channel leading into it, however, has only 6 feet water. It abounds in fish, and at the east end it communicates, by means of a small creek, with the Chamalacon river.

Port Cortez.—The north shore of the bay is clear and very steep-to; there are 4 fathoms water at only a short distance, all the way in; but from the south side a sand flat stretches gradually off, and the 3-fathom line lies about WSW. from the mouth of the lagoon. Several small streams enter the south side of the bay, which afford good water. This is a good harbor during Northers, but is open to the westward.

Railway.—This port is the terminus of the inter-oceanic railway, now in course of construction; it is to be laid to Fonseca on the Pacific, a distance of 220 miles; the railway is to be 3 ft. 6 in. gauge, and it is forming in three parts; its progress has, however, been interfered with by the political troubles of the country. The only section of the line completed is from port Cortez to San Pedro, a distance of 37 miles, which is in poor order, and on which no regular trains run. A wharf, built by the Inter-Oceanic Railroad Company, has gone to ruin, the shore end only remaining.

Anchorage.—Caballos point is clear, and has 6 fathoms close-to; within there is good anchorage, sheltered from Northers, in 10 to 7 fathoms, on sand, at ½ mile or less from the north shore. There is a rise of tide of about a foot.

Red Cliffs bank.—At the western extremity of port Cortez, S. by W., 3 miles, from Caballos point, and 4½ miles to the eastward of Omoa, are seven small, low, yet remarkable, red, cliffs, visible from a distance of 4 or 5 miles. From abreast these cliffs a shallow bank, called Red Cliffs bank, extends out a considerable distance, which must be approached very guardedly, for its limits are not exactly known. Between the cliffs and Omoa point it is said to extend 2 miles; and NE. by N., 1½ miles, from the latter, there are 4½ fathoms on the outer part, whence it gradually approaches that point.

Direction.—In running past port Cortez and Omoa, a hill on Chimlico point should be kept open of point Caballos, to clear the bank off the red cliffs; this track will lead near its edge, in 5 and 7 fathoms.

Omoa bight.—The northeast extreme of the bight of Omoa forms a low but very prominent point, whence the coast suddenly trends to the southwestward, 9 miles, and then northwestward, 11 miles, to the entrance to the Motagua river, which is W., 15 miles, from the castle of Omoa. This extensive bend is 6 miles deep, clear and steep, with depths of 20 to 30 fathoms at the distance of a mile from the shore, and 60 at its outer limit, close to the edge of soundings. So heavy a swell rolls into it, however, that there is no safe anchorage except off Omoa.

The east side is bounded by the base of the Omoa mountains, which terminate to the SW., 9 miles from the head of the bight, at the Motagua peak, upwards of 7,000 feet above the sea. This lofty ridge decreases somewhat gradually in height to the northeastward, and presents three more remarkable summits. Omoa peak, the nearest to the Motagua, about 3 miles inland, and SSW., 9 miles, from Omoa castle, rises to a small, sharp-pointed cone, which is very steep on its west side. The next is also a sharp-pointed peak, 3,270 feet high, S. by E. ½ E., 4 miles, from the castle; but when viewed from the NW., a small shoulder is seen projecting a little below the summit. The other, which is situated at the northeast extreme of the range, about 5 miles to the eastward of the castle, is 1,760 feet high, and, when seen from the northward, forms a saddle.

The Motagua and Omoa peaks, being so lofty, are seldom visible, except in the dry season, at the dawn of day, when the former may be seen from Belize, 115 miles distant. The two others are generally unclouded, and will be found very useful guides, especially the Saddle hill. The western side of the bight is low and swampy, and bounded by a dark sandy beach, fringed with cocoanut and other trees, which reach to a height of about 200 feet above the sea. These features extend all the way to cape Three points, 33 miles from the bottom of the bight.

Omoa.—The basin of Omoa is formed within a low mangrove island, nearly ½ a mile long, north and south, and 400 yards broad, which in 1841 was only a thin sand-bank. The entry between the south point and

the main shore is now only 290 yards across, with 8 feet water on the bar; this depth varies greatly after NW. gales; within is a secure harbor for small vessels, with 5 fathoms in the inner part, but the whole is fast filling up.

San Fernando castle.—Opposite the south point of the island, and close to the shore, is the castle of San Fernando, which commands the basin and anchorage. The outer walls are about 15 feet high, and upon them are mounted, en barbette, 10 or 12 brass 24 and 32 pounders; within them is a barrack 40 feet high, the base of which is on a level with that of the outer walls. At the south angle of the fort is a light tower, 60 feet high, but no light is shown; and the whole of the works are in a state of dilapidation and decay.

About ½ mile to the eastward the castle is commanded by a hill 110 feet high, upon which there is a lookout tower. At the base of this hill, on the southwest side, is a straggling village of huts. A considerable commerce is carried on between this place, Tegucigalpa, and Comayagua. Its imports are cotton goods, flour, and spirits; its exports chiefly indigo, tobacco, sarsaparilla, hides, and native silver. Cattle are abundant and supplied to the Belize market.

Water and wood are to be procured at a short distance from the mouth of the Omoa river, which has 6 inches on its bar; but the water is said not to keep good for any long period.

Anchorage.—Anchorage will be found in 4 fathoms, sandy bottom, the castle bearing ENE. ½ E., 800 yards distant, and the outer part of the island N. ½ W.; this position, however, is not secure in the season of the Northers. A vessel will generally have to warp into the basin, the depth on the bar being previously tried.

Directions for Omoa.—The current on this shore is so variable, and yet so strong, that vessels bound to Omoa or the anchorage in the gulf of Honduras, should by all means endeavor to sight either of the outlying islands to windward, to avoid the Honduras reefs.

Coming from the eastward, after sighting the Swan islands, vessels often pass inside Bonacca, and out between Roatan and Utilla, but the positions of the shoals to the southward of the southwest end of Roatan are still so doubtful, that it will be far more prudent to pass to the northward of these islands.

From abreast Utilla, a course should be shaped for Caballos point, which will sight the saddle hill; the highest peaks being seldom visible in the rainy season, and only occasionally in the dry. From Caballos point, the shore should be kept at a distance of about 5 miles, to avoid the shoal ground off the red cliffs.

The northeast point of the Omoa bight, though very low, is so prominent that it cannot be mistaken; and when within 4 or 5 miles to the northeast of it, the lookout tower and the castle will be seen through a gap in the mangroves.

The point should be approached from the northwest, or else rounded cautiously by the lead; at 1½ miles to the northward of it there are 5 fathoms, whence the depth decreases to 3 fathoms, to within about 400 yards of the west side of the cay; 200 yards farther out there are 17 fathoms. Being abreast the end of the spit, a vessel should haul in quickly, and anchor in about 6 fathoms, abreast the fort, with the west extreme of the cay bearing N. ½ W:

When bound out, a vessel will generally receive great assistance from an easterly current, which at times is found to run along the shore to a considerable distance, even as far as Truxillo, and to a wide offing, especially after Northers and heavy rains. In the winter months, when the trade wind hangs to the northward of east, it would be better to keep this advantage until well to windward, to give the Honduras banks a wide berth.

This eddy stream runs strongest near the shore, and its outer limits are uncertain; but the navigation within the islands is attended with great risk, especially abreast Utilla, and in the night.

Rivers Motagua and Tinto.—About 2½ miles from the bottom of the bight of Omoa, the Cuyamel river empties, and 3½ miles farther to the northwest is the entrance of the Tinto. The former is of little importance; the latter forms the boundary between the states of Spanish Honduras and Guatemala. It is said to be navigated by canoes to a considerable distance, and just within its mouth a small branch communicates with the Motagua.

The Motagua takes its rise about 35 miles to the westward of the city of Guatemala, and by its means a considerable commerce is carried on between several large towns in the interior and Belize. There are 3 feet water on the bar, and it is navigated by large bongos to a town of about 2,000 inhabitants, called Guelán, situated about 90 miles in a direct line from the entrance. The voyage upwards occupies about 14 days, and in the dry season is attended with great labor. The first rapids are met with at the junction of the river Nuevo, about 40 miles from the mouth.

Anchorage.—Although completely exposed to the sea breezes, there is good holding ground in 13 fathoms, with the entrance of the Motagua river bearing about SW., a mile distant.

The edge of the bank lies only 3 miles from the shore, whence it trends about N. ½ W., 16 miles, to the southernmost of the Zapatillas cays.

River San Francisco has two mouths, about a mile apart, 5 miles to the westward of the Motagua. There are some huts at the eastern entrance, and the locality is further pointed out by a somewhat remarkable piece of table-land, 600 feet high, SW., 7 miles, from the mouth. The bars have only 2 feet water, and at a short distance within them

the river communicates with the head of Hospital bight by a branch navigable for canoes.

Cape Three-points, the northeast extreme of the bay of Honduras, being the termination of a low neck of land, about 10 miles in length, forms a prominent, unmistakable, rounded point, ¾ of a mile broad, the trees upon which are about 80 feet above the sea. Foul ground extends from it to the westward, about ½ mile, which generally breaks; and SW. ½ S., ¾ of a mile, from the cape, lies a small shoal of 2½ fathoms; both of which are steep-to. There are 7 fathoms inside the latter, and 15 close outside it. The coast from the cape trends S. by E. ¾ E., 1½ miles, to Monavique point, whence it curves to the SE., for 5½ miles, to Firewood point, at the entrance of Hospital bight.

Anchorage.—With Monavique point bearing NNW., about a mile from the shore, there is well-sheltered anchorage in 13 fathoms, muddy bottom. Care, however, must be taken not to bring Firewood point to the eastward of SE. by E., to avoid the Ox Tongue spit.

Hospital bight, so named from the extreme unhealthfulness of its position, being surrounded by swamps, is about 4 miles deep, from west to east, 2 miles in extent in its broadest part, and, at the entrance, is a mile wide. A sand-bar extends across the opening, with 14 feet water on it; and within, there is a space of about a mile, with depths from 3 to 4 fathoms. Outside the bar the ground is also shallow, which renders the approach intricate and difficult to a stranger; it is, however, seldom visited.

Ox Tongue.—From the above bar a ledge of hard, black sand, about 1 mile in breadth, extends to the westward, 7 miles, named the Ox Tongue. The general depths upon it are 2¼ to 3 fathoms; but, with cape Three-points bearing N. ½ E., there is a spot of about 1 mile in length with only 9 feet water. From a depth of 2¾ fathoms on the west extreme of the ledge cape Three-points bears NE. ¼ N., 5½ miles, and Mangrove point, at the entrance of Hospital bight, ESE. ½ E.

St. Thomas bight.—From Mangrove point, an irregular mangrove shore trends southward, about 7 miles, to the entrance of St. Thomas bight. This snug inlet, situated at the foot of the Trepong mountains, which reach their highest elevation about 10 miles to the southwest, is about 3 miles long, north and south, 1½ miles wide at the entrance, and about 2½ miles across at the inner end. Its shores are skirted round by a mud flat, leaving in the middle a bight ¾ of a mile wide at the entrance and 1½ miles wide at the south end, with depths from 3½ to 5 fathoms, over mud. Although open to the north, it is quite safe, for these winds do not blow home to this part of the coast; and, being comparatively healthy, it is by far the best place to water at in this locality.

Water.—On the south shore is a small Belgian settlement, through which runs a rivulet of good water. The most convenient place for

watering a vessel, however, is at a small creek at the base of the mountains on the western shore, into which boats may pull and fill their casks with the greatest ease.

Directions for St. Thomas bight.—This bight will admit vessels of moderate size, and the only danger in the way is the Ox Tongue. Great care must be taken not to haul up too quickly round the west end of this shoal, for it is doubtful whether the trees on Mangrove point, which bear ESE. ½ E. from it, can be seen at that distance. From the end of the ledge, a SSE. ¼ E. course will carry a vessel up to the entrance, in 5 fathoms, when all that is necessary is to steer in mid-channel and anchor as most convenient. If intending to water, 3 fathoms will be found at only 200 yards from the entrance of the creek pointed out above.

In working up to the southward of the Ox Tongue, the shore may be approached by the lead into 4 fathoms; but in standing to the northward, Mangrove point must not be brought to the southward of E. ½ S., for the Ox Tongue ledge is so steep that the soundings give no warning.

The Coast.—From Palma point, the northwest extreme of St. Thomas bight trends WNW., 7 miles, to the east point of entrance to the Dulce river. At 1½ miles from Palma point is the little village of Sta. Maria. The land in this space is of moderate height, but south, 3 miles, from the entrance point of the Dulce, it reaches an elevation of 1,120 feet.

River Dulce.—The mouth of this river is SW. ¼ S., 10 miles, from Cape Three-points. The opening forms a funnel or bight, about 1 mile wide and 1 mile deep, and it is readily distinguished by a small village on the west side; there is also at the mouth, on the eastern side, a remarkable hill, 670 feet high. The bar fills the whole bight, and extends about a mile beyond the points, having upon it 6 feet water; generally, however, there are 6 or 8 inches more water in the evening than in the morning, owing to the river stream being checked by the sea breeze. The mouth of the river lies at the southwest corner of the bight, and is scarcely 200 yards wide. Thence it winds its narrow, tortuous course in a southwest direction, between precipitous, densely wooded hills, from 300 to 400 feet high, for about 5 miles, in a direct line from the sea, when it enters the Golfete. The soundings in this branch are generally deep, but irregular, varying from 2½ fathoms to as much as 18 fathoms. Near the inner end two small streams enter opposite each other.

El Golfete may be described as a salt-water lake, 9 miles long, northeast and southwest, 1¼ to 2½ miles wide, and from 2 to 2¾ fathoms deep; all its shores are low and swampy, and bounded by mangroves. The western branch of the Dulce is generally much wider than the eastern, being from 300 yards to ½ mile wide. The course of the stream is also less tortuous, and is confined between low mangrove, swampy banks. Its whole length is about 7 miles, and it carries from 2 to 5 fathoms. At the inner end a small tongue of land, about 40 feet high, projects from

the west side, and upon it is Fort St. Philip, which, however, is merely a wall about 14 feet high, with a barrack for the accommodation of a commandant and 20 soldiers. The channel is here about 300 yards wide, and the above point must be passed within 100 yards.

The gulf of Dulce is about 23 miles long, ENE. and WSW., and 6 to 10 miles wide, with depths of from 6 to 8 fathoms, soft mud, which are increased about 3 feet in the rainy season. It is remarkable that, although receiving the waters of many streams, there is no perceptible current on the surface of the gulf. In the lower branch the river stream runs out at the rate of 1½ to 2 knots according to the seasons.

From the entrance, the north shore ascends to the Santa Cruz mountains, which, about 7 miles inland and about N. ½ W. from Izabal, reach to a peak 3,420 feet high, visible from off cape Three-points. Large quantities of mahogany are cut on this side of the lake; and the land is partially cultivated. The east and west ends are low and swampy. The south side is, for the greater part, bounded by the Mico mountains, which, at only 3 miles from the shore, reach an elevation of 2,835 feet. About 20 miles to the northeastward the Trepong range rises to the height of 7,700 feet. Manati and alligators are abundant in the rivers, and the woods abound with wild beasts and large snakes.

Izabal.—On the south shore, SSW. ½ W., 16 miles, from Fort St. Philip, on the rise of the hills, is the village of Izabal. The largest house, nearest to the Moro rivulet, is in lat. 15° 24′ 20″ N., long. 89° 9′ 15″ W. It is a place of rising importance, being the northern port of entry for the commerce of Guatemala, to which European goods, brought chiefly from Belize, are conveyed on mules. From the village the journey to Guelán, on the Motagua, is made in about 3 days, and from thence to the city of Guatemala in 10 or 12 days; the roads, however, are bad.

The navigation to Izabal is conducted in small schooners, and is easily accomplished in about two days, by taking advantage of the sea breezes.

The wind generally blows up through the narrow valley which incloses the lower branch, but in some parts it may be necessary to warp up alongside the banks, especially if the breeze is light outside.

River Polochic.—Several small streams enter the gulf of Dulce from the southward; but the only one of any magnitude is the Polochic, which flows into the southwest corner by several mouths over bars of 3 feet water. This river takes its rise on the table-land of Guatemala, and, about 30 miles from the mouth, receives, from its left bank, the waters of the Accajabon. It is navigated by large bongos of 2 feet draught, as far as the village of Taleman, about 90 miles from the gulf, whence their cargoes are conveyed to the interior on mules.

The coast from the Dulce river, takes a WNW. direction, for 5½ miles, to Cocalli point, and is of moderate height. About 600 yards to the northwestward of the west point of the entrance of the river is a small

rocky islet. A flat extends to the northward of this islet, 1½ miles, with depths from 1 to 2½ fathoms. With the islet bearing SE. by S. and Cocalli point bearing W. ¼ N., about 1 mile from the shore, there is a detached shoal, 2¼ fathoms, which has 4½ fathoms around it. To the westward of this the shore is bold; there are 3 fathoms water 600 yards distant, and the depths gradually increase outwards.

Kowich creek.—About 1¼ miles westward of the islet is a small creek of excellent fresh water, named Kowich, which is pointed out by a few huts on the west side of it; a mile farther on there is a remarkable waterfall.

Cocalli point is a prominent round bluff. At the distance of ½ mile westward of it is a ledge, with 2 fathoms water, and 4 fathoms close outside. From the point the shore trends SW., ¾ of a mile, to Cocalli river, which has 3 feet on its bar, and is a good watering place.

Anchorage should be taken up for this purpose, with the entrance of the Cocalli river bearing SSE., and the bluff SE. by E ½ E., 1 mile distant.

The coast, from the river, trends westerly, 2 miles, to San Martin point, which has some huts upon it; thence NW., 3 miles, to the Sarstoon river. All this part is low, but at the distance of about 2 miles it is backed by the Sarstoon chain of mountains, which, rising gradually from the Dulce river, reach an elevation of 910 feet south of Cocalli point, and 1,395 feet on the same bearing from the entrance to Sarstoon river; thence it takes a direction to the southward of west, and continues nearly of the same altitude for some distance.

Sarstoon river is of considerable magnitude, and forms the southern boundary of British Honduras. The entrance is about 600 yards wide, and on the bar there are 6 feet water. In the rainy season the stream runs out at the rate of about 1 knot.

Anchorage.—The depths gradually decrease from 5 fathoms, at the distance of about 2½ miles, to 3½ fathoms, 1¼ miles from the shore, where anchorage will be found with Cocalli bluff bearing SE. by E. ½ E., and the north point of the entrance of the Sarstoon river WSW. ½ W. A large vessel must anchor farther off.

The coast, from the Sarstoon river, trends NNW., 4½ miles, to the entrance of Tomash river, whence it curves to the northeastward, for 5 miles, to a remarkable high bluff, named Mother point, which is visible at 15 miles. From this projection it takes a northerly direction, for 2 miles, to the Moho river, when it again curves to the northeastward, for about 3 miles, to Punta Gorda.

Punta Gorda is NW. by W., 13 miles, from cape Three-Points, and may be described as the northwest point of the bay of Honduras. On the north side of the point there is a Carib settlement, the inhabitants

of which cultivate the adjacent land, and supply Belize with cattle, fruit, and vegetables.

To the southward of Tomash river the shore is clear, with regular depths decreasing inwards from cape Three-Points, off which there are 17 fathoms. The only exception is a small spot, ¾ of a mile in extent, with 3½ fathoms, from whence cape Three-Points bears E., distant 10 miles, and Cocalli point S. by W. ½ W., 5½ miles. The 10-fathom line is 1½ miles to the eastward of it, and the bottom is everywhere muddy.

The bars of the Sarstoon, Tomash, and Moho generally break heavily. Their banks are swampy, and fringed with impenetrable mangrove to a long distance; but after a journey of 3 or 4 days, probably at the distance of 40 to 50 miles from their mouths, the land becomes firm, and covered with mahogany, which is cut and shipped either off their bars, or conveyed to Belize for that purpose.

In the space between the above rivers, the coast is generally low and flat to a considerable distance inland; it is densely wooded, and the tops of the trees are about 200 feet above the sea. At 6 miles, W. ½ N., from Mother point there is, however, a small isolated hill, 400 feet high; and NNW. ½ W., about 3 miles, from Punta Gorda, is a remarkable saddle hill, 728 feet high. About 11 miles westward of the saddle the interior again becomes mountainous, and reaches an elevation of 1,060 feet. In a northeast direction, about 6 miles from the saddle, there is also a small but conspicuous ridge, named the Seven hills, which rises from the shore to the height of 470 feet.

The coast northward of Tomash river, as far as Negro head—which is a conspicuous bluff, NE. ½ E., 28 miles distant—is exceedingly foul and dangerous, being skirted by detached shoals and cays which extend 2½ to 5 miles from the land. The southernmost danger lies E. ½ S., about 4 miles, from the Tomash; the northernmost terminates at the easternmost of the Snake cays, which lies SSE. ½ E., 4½ miles, from Negro head, and NNE. 16 miles from cape Three-Points.

Several channels leading into the anchorages off the mouths of the river are pointed out on the chart, but they are so intricate, though deep, that no safe directions can be given; and the water is so muddy that no vessel ever attempts to thread them without a pilot.

Tides and currents.—There is no regular tide on this shore, but in general there is about 1 foot more water on the bars of the rivers in the evening, according to the strength of the sea breeze. The accumulated waters from the rivers spread out in a northerly and northeasterly direction, and meeting with those coming to the southeast from the northern streams, combine outside cape Three-Points, to form an easterly current, which, as before stated, sometimes runs up as far as Truxillo.

The breadth and velocity of this eddy is of course very variable, depending upon the force of the wind and the state of the rivers. In general it does not extend out so far as Utilla, and its strength is much increased after Northers. To the northward and eastward of this the

great Caribbean current runs to the westward, at the rate of from ½ to 1 knot an hour. On reaching the outlying reefs off Yucatan, and striking the edge of the bank, it is suddenly diverted to the northward, increasing its velocity to 2 knots, and even more, in the vicinity of Cozumel island.

Winds.—The prevailing winds are the periodical land and sea breezes; the latter sets in at about 10 a. m., and continues until late at night in the dry months, but in the rainy season it is very light, and seldom blows home to the shore. Northers are said not to come to the southward of Placentia point; on the contrary, when they occur, a strong SW. wind blows off from the bay shore, which is preceded by the usual appearances of a Norther. The Trepong mountains being free of clouds is considered a sure warning, and the barometer will fall from 30.0 inches, the general height, to 29.80.

Icacos road.—At 3½ miles, SW. ½ W., from Negro head, a neck of land, covered with pine trees, projects to the southward, about a mile, and close off the end of it is a small cay, the southwest end of which is named Icacos point. Off the west side of the neck, about 600 yards from the shore, there is well-sheltered anchorage, in 3½ to 4½ a fathoms, named Icacos road.

At the inner end of the above tongue is a small cove, with depths of from 9 to 14 feet, and close to the westward of the cove is a lagoon, with 7 feet water at the entrance. There are some wells on the end of the tongue which might be useful in a case of need.

Snake cays are four in number, and lie, with numerous shoals, in the approach to Icacos road; the cays are covered with trees, the tops of which, on the east cay, are about 90 feet above the sea.

Caution.—In working out of the bay of Honduras, when standing to the northward, the East Snake ought not to be brought to bear eastward of NE.; when within 4½ miles distance of the cay, this line of bearing will carry a vessel over several patches of 3½ fathoms of water. The northeasternmost of these patches lies with the cay N. by E. ½ E., 1½ miles distant, but eastward of this the bank is clear for a space of 7 miles, to the west side of the outer shoals.

Grande and Deep rivers.—The rivers in the bight northward of Punta Gorda, whence mahogany is shipped, are the Grande and Deep rivers. The former empties 5 miles from Punta Gorda, and vessels receive their cargoes from it at a snug anchorage off the west side of the Moho cays. The Deep river enters the sea about 4 miles, NW., of Icacos point. These rivers have only 2 feet of water on their bars.

Border cays and reefs.—From the head of the bight which the bank forms at the entrance of the gulf of Honduras, on the parallel of 16° N., the edge of soundings trends NNE., 37 miles, to a sharp elbow,

named Gladden spit, in lat. 16° 31′ N., long. 87° 58′ W., 23 miles from the main. Here it curves to the NW., and round to the northward, to another elbow not quite so sharp, N. ½ W., 33 miles distant, and 15 miles from the coast; whence it takes a northerly direction, for 50 miles, to the south end of Ambergris cay, which lies adjacent to the shore.

The whole of this line, which is 110 miles in extent, is skirted at the very edge by small, low cays and reefs of the most dangerous character, which, in most parts, break heavily. Several openings are clearly delineated on the present charts; but the features of the cays are so similar that, without the assistance of a pilot, or an exact knowledge of the latitude, to attempt to navigate them would be extremely perilous. A description of them will follow, but only with a view of assisting the mariner in a case of imminent danger.

Zapatillas cays.—This cluster of five low islets, lying in a space of about 3½ miles, is the southernmost on the bank. The south cay has some cocoanut trees upon it, and is in lat. 16° 05′ 30″ N., long. 88° 18′ W. To the southward and westward of it, to a distance of 4½ miles, the depths are extremely irregular, varying suddenly from upwards of 30, to as little as 3 fathoms.

SW. ledge is a very dangerous small ledge, with depths of only 2 and 2½ fathoms, leaving a clear space of 11 miles between it and the main to the southward. From SW. ledge, the south Zapatillas cay bears ENE. ½ E., 6½ miles; and east Snake cay NW. ½ N., 11 miles.

Seal cays, two in number, lie close together, NW. ¼ W., 3½ miles, from south Zapatillas cay, and have upon them some cocoanut trees and fishermen's huts.

Lawrance rock, with 4 feet water, is the westernmost danger, and may be said to form the east point of entrance to the inner ship-channel to Belize. This rock is the more dangerous as the water over it is not sufficiently discolored to point it out. From Lawrance rock the Seal cays bear SE. by E., 4¼ miles.

Zapatillas cut.—Close round the north end of south Zapatillas cay there is a clear opening, nearly ½ mile wide, through which a vessel might thread her way into the main channel.

Nicolas cay, the third northward of Zapatillas cut, is occasionally inhabited, and has a well of good water upon it.

Tom Owens cay lies NNE. ¾ E., about 8 miles, from south Zapatillas cay. Both north and south of it are channels, nearly ½ mile wide, carrying 4½ and 5 fathoms into the inner passage. On the south side of the south channel, ¾ of a mile from Tom Owens cay, are two small, bushy islets.

North Spot cay, and cut.—About 3 miles to the northward of Tom Owens is a small sandy cay, named North Spot, covered with grass; and close to the northward of it there is an opening, carrying 3½ fathoms.

Ranguana cay.—This islet lies about 5½ miles from North Spot cay, in lat. 16° 20′ N., long. 88° 9½′ W., and the edge of soundings east of it is distant 2 miles. It is a little larger than either of the Zapatillas, and the tops of the trees upon it are 50 feet above the sea. Close to the southward of the cay is a channel, about ¼ of a mile wide, carrying 3½ fathoms in a NW. direction.

Pumpion, Round, and Samphire cays.—At 4½ miles, NE. ½ N., from Ranguana cay, is Pumpion cay. About 2 miles farther on are the two Round cays, and the same distance beyond these is Samphire cay. The latter is composed of sand, upon which bushes grow to the height of 6 feet. The others are covered with trees 40 to 45 feet high. The space is very foul and dangerous.

Queen cay cut.—At about 1 mile to the northward of Samphire cay, are three small, low, sandy islets, covered with bushes about 10 feet high, named Queen cays. They lie about 5 miles from the end of the Gladden spit, and 1½ miles from the edge of soundings east of them; where there is an opening carrying 3½ fathoms into the Victoria channel. The bank within, however, is here so studded with cays and shoals as to render the navigation extremely difficult.

Gladden Spit cut.—This opening is about 1 mile to the southward of the end of Gladden reef, and is 1 mile wide, with depths of from 3 to 4 fathoms.

The reef from Gladden spit, for a space of 13½ miles, presents a solid barrier, clear of cays. To the northward of this, for a distance of about 6 miles, to South Water cay, it becomes broken, and has upon it some dry rocks and small sand banks, between which are several little openings for coasting vessels of 10 feet draught.

South Water cay is inhabited, and the trees upon it are about 60 feet above the sea. On the west side are some wells of good water.

Tobacco cay cut.—From South Water cay, a reef, nearly dry, trends N. by E. ¼ E., 4½ miles. Here there is a narrow cut, carrying 13 feet into the Victoria channel. On the north side of it is Tobacco cay, with trees upon it, the loftiest of which is a very remarkable large fig tree 70 feet high. The locality is also pointed out by the Tobacco range of cays, 2 miles in extent, which lie at the back of the opening.

The reef, from this point to English cay, 26 miles distant, forms again a solid barrier, dry in many parts, and so steep that there are upwards of 50 fathoms water within ¼ of a mile of it. The current generally sets strong towards it, accompanied by a heavy swell, so that too much caution cannot be observed in this neighborhood.

Glover reef, situated in front of the bight between Gladden spit and Columbus cay, and 12 miles distant from the edge of the bank, is 15 miles long, N. by E. and S. by W., 6 miles broad at the north, and 4 miles at its south end. With the exception of the east side, which curves

slightly inwards, it presents everywhere a straight barrier reef, impassable to anything larger than a coasting or fishing vessel.

At the northern edge there are said to be two white sand ridges, visible at some distance. At the south end are four small cays and some dry sand banks, which are inhabited by fishermen, and furnish water. NE. cay lies on the edge of the bank, about 3½ miles from the southeast extreme. The two SW. cays lie on the middle of the south edge. They are wooded, and have upon them some conspicuous cocoanut trees.

Anchorage.—At the west end of the SW. cays there is an opening which will admit vessels not drawing more than 12 feet, into good shelter. In case of need, large vessels will find temporary anchorage under the southwest end of the reef, in 6 or 7 fathoms, with the SW. cays bearing E., 1½ miles distant. Elsewhere the bank is so steep that the lead gives scarcely any warning.

From the northeast point of the bank the south extreme of Hat or Light-house reef bears NNE. ½ E., 14½ miles distant, and cay Bokel NW. ½ N., 18 miles distant.

Light-house reef is the outermost of the outlying banks, its north end being about 43 miles from Belize, the nearest part of the coast. It is 24 miles long, NNE. and SSW., but being slightly irregular in outline, it varies from 2 to about 5 miles in breadth. It is everywhere bounded by a barrier reef, which, at the north end, forms a half-moon curve outwards about 4 miles in diameter. The east side of the reef, from the north end, trends about SSW., for 12 miles, and then S., 7 miles, to Half-moon cay, without any opening, and is steep-to.

Northern cays.—Close to the northern extremity of the bank is a litte islet, about ½ mile in length, N. and S., and a short distance to the southward of it is a wooded cay 1½ miles long, NW. and SE., and ¾ of a mile broad.

Saddle cay.—About 2 miles to the northward of Half-moon cay, and 1 mile from the eastern edge of the reef, is a small rocky islet with a clump of trees on it, which forms a saddle-shaped summit; hence its name.

Half-Moon cay is a narrow islet, about ¾ of a mile long, east and west, with a curve to the northward; it is from 10 to 30 feet high, covered with trees and bushes, and its south side is bounded by a sandy beach. From the southeast end of the cay a spit of the bank extends SSE., for about 1 mile, with depths from 7 to 10 fathoms. At ½ mile, and also at 1 mile westward of the cay, there are small openings, carrying 12 feet water, into snug anchorages for vessels of 10 feet draught.

The reef, from the cay, takes a westerly direction, for 3½ miles, and then curves suddenly to the southward, for 4 miles, to the south extreme of the bank, forming a dangerous bight. The extremity of the reef terminates almost in a point, SW., 6 miles, from the light-house, whence it

takes a northerly direction for about 6 miles, so that this end of the bank, for this space, is only about 2 miles broad, and is sometimes termed the Hat cay reef. The course and distance from the south end of it to cay Bokel, at the south end of Turneffe, is W. ¼ N., 17 miles.

The inhabitants depend on rain-water caught in tanks, but they never have a large supply.

Light.—At the southeast point of Half-moon cay, in lat. 17° 12′ 15″ N., long. 87° 32′ 30″ W., there is a skeleton iron light tower, painted white, which exhibits a *fixed* light 70 feet above high water, visible in clear weather 12 miles.

Pilots.—The Belize pilots remain on the look-out about the light-house, and vessels generally make it in order to obtain one. Should this occur during the night, do not run on after sighting it, but keep well to windward, under sufficient sail to prevent drifting towards the reef, bearing in mind that the current generally sets strong to the W. or NW., and with strong easterly winds there is a heavy sea. Should the weather be unfavorable for sighting the light from a wide offing, and the reckoning at all doubtful, especially the latitude, it will be more prudent to haul off and await daylight.

If necessary to stop for a pilot, which, however, is seldom the case, as they are always on the alert, it will be safer to do so at the anchorage off Hat cay. There are pilots stationed at Half-moon cay, Mauger cay, and port Belize.

Hat cay lies on the western edge of the reef, about 3 miles from the south end. It is small and covered with bay cedar trees, one of which, in the center, rises a little above the rest, giving to the clump somewhat the appearance of a hat.

Long cay, situated also on the western edge, about 2 miles northward of Hat cay, is very narrow, but about 2 miles long, north and south, and covered with trees skirted by mangroves. The reef from abreast the north end of Long cay forms a sudden bend to the eastward, for about 2½ miles, and then takes a northerly direction, for 7 miles, to a dry sand bank. About 2 miles farther on, it trends NE., 10 miles, to the cays at the north extreme of the bank. Off this latter part there are depths from 6 to 10 fathoms, over rocky bottom, at the distance of about ½ mile from the reef, but elsewhere the edge is steep-to.

Anchorage.—In the event of having to wait for a pilot, instead of beating about in so dangerous a neighborhood, a vessel will find temporary anchorage under the lee of the west side of the reef, southward of Hat cay, in 4½ fathoms, with Hat cay in line with the east extreme of Long cay, and the angle from them to the light-house 45°.

Great care, however, must be taken not to steer too far in, for the reef is steep, and the narrow strip of soundings extends to only a short distance.

Turneffe islands.—This extensive cluster of mangrove islands lies on a bank of coral and sand, 30 miles in length, north and south, and from 4 to 9 miles in breadth. From near the south end, to within 6 miles of the north end of the bank, they are so closely grouped, that, at a distance, they have the appearance of being one flat island. There are, however, several openings, leading into large lagoons, having from 4 to 8 feet water, and abounding in turtle and fish. The only one inhabited is Indian cay, situated on the east side of the group, which is partially cultivated. They are all skirted by a barrier reef at only a short distance from the east and west sides, but from the north end, as before stated, it extends 6 miles from the main body of the islands. Upon this part there are three detached cays, named Three Corner, Crawl, and Mauger.

Lights.*—Mauger cay, the outermost and much the smallest of the above cays, lies about 1½ miles from the northeast point of the bank; and from its northwest end, in lat. 17° 36′ 15″ N., long. 87° 46′ 30″ W., are shown *three fixed white* lights in the form of a triangle. The upper light is 53 feet, the lower ones 49 feet above the sea, and are visible in clear weather 13 miles. The lights can be seen above the trees from all points of the compass. Beyond a distance of about 5 miles the lights show as one, but within that distance three distinct lights are visible between the bearings W. ½ N. and S. ½ W. In a NW. and SE. direction the lights are in line and appear as one. The lighthouse is a skeleton iron tower, and can be seen, from seaward, only between the bearings NE. ¾ E. and SW. by W. ¾ W.

From the northwest point of the bank to the nearest part of the Honduras reef west of it, the distance is 11 miles.

Anchorage.—There is said to be anchorage for small vessels to the westward of Mauger cay; and under the west side of Crawl cay, in 6 or 7 fathoms, on the edge of the bank, the south end of the cay bearing E., about 1 mile distant. Vessels leaving Belize generally discharge their pilots here.

Cay Bokel.—Close off the south end of the main group are three or four small, detached islets, the southernmost of which is cay Bokel. This small, low islet is composed of sand, covered with bushes, and has upon it some conspicuous cocoanut trees.

Lights.—Two lights are shown from cay Bokel, suspended horizontally from a yard on a white mast, one *fixed white*, the other *fixed red*, elevated 60 feet above high water, and visible in clear weather from distances of 8 and 5 miles respectively.

The distance between the west extreme of the Turneffe reef and the sand bank at the entrance of the Belize ship-channel is only 4½ miles, and is the narrowest part of the passage.

* From information received Feb. 5, 1885, it appears that the upper light at Mauger cay is less than a foot above the other two, and that the three lights are liable to show as one, and be mistaken for the light on Half-moon cay.

Anchorage.—The edge of the bank lies close to the south side of the above cay; but soundings extend a mile westward of it, where anchorage will be found in 5 or 6 fathoms, with the cay bearing ESE., or SE. by E., and the first opening in the main group, NE. ¾ E.

Caution.—Vessels proceeding to Belize, overtaken by night, will find it more advantageous and prudent to lie at the above anchorage until daylight, than to keep under way in so dangerous a locality.

Those of moderate draught will find clear anchorage off Joes hole, about 5 miles northward of cay Bokel, and at several other parts under the west side of the reef, where soundings extend from ½ mile to 1 mile. It requires, however, very great care to steer clear of the numerous rocky patches, and not to shoot within the depths of 5 or 6 fathoms.

The river Belize takes its rise in the mountains which bound the Honduras territory, at the distance of about 100 miles direct from the shore. Its general course is about ENE., but it is very tortuous, and empties by two mouths, one about 3½ miles NW. of the other; the southern, however, is the principal entrance, and is navigated by large flat-bottomed canoes to a great distance. Gold, it is said, has been found in a branch of this river, called Roaring creek. There is a depth of about 4 feet at the entrance.

Belize, the seat of government of British Honduras, stands at the southern mouth of the river, which divides the town into two parts, and is crossed by a wooden bridge. The land being very low and swampy, the houses are constructed of wood, and raised about 10 feet from the ground on pillars of mahogany. The population is about 6,000. The exports are cedar, mahogany, rosewood, logwood, indigo, cochineal, sarsaparilla, cocoanuts, deer-skins, tortoise-shell, and specie. Maize, rice, yams, and plantains are cultivated for the consumption of the inhabitants; and a considerable number of cattle are raised for labor in the mahogany works. The imports are chiefly flour, cotton manufactures, and hardware, a large portion of which is conveyed to the adjacent ports and rivers of Central America. The Lunatic Asylum, built on the site of fort George, lies on the north side of the entrance to the river, in lat. 17° 29′ 20″ N., long. 88° 11′ 53″ W.

Belize harbor, situated in front, and to the southward of the town, is about 10 miles in extent, east and west, and 3 miles wide, protected to seaward by the main reef and numerous mangrove islands, named Drowned cays and Triangles. In the western portion are several small, detached patches, with depths of 4 and 3½ fathoms, and one in the middle of the harbor with 3 fathoms; but in the eastern part, for a distance of 4 miles from the cays, there are regular depths of 6 and 7 fathoms, over sand and mud, affording secure anchorage for vessels of large size.

The northern part of the harbor is bounded by the bank thrown up by the sand and débris from the rivers. On the edge is a narrow ledge,

about a mile long, east and west, named the Stake bank; the center of which is nearly dry, and bears SE. by E. ¼ E., 3½ miles, from the Lunatic Asylum. There are 5 fathoms at 400 yards to the southward of this bank.

The harbor appears to be gradually silting up. In May, 1877, there was found to be about 2 feet less water than formerly; and the channel leading into the river Belize, towards the custom-house, is shoaling; at times it is difficult for small boats to approach the wharves for the purpose of unloading cargo.

Middle ground.—At 1½ miles westward of Stake bank, on the edge of the 3-fathom line, is a small patch of 5 feet water, with 15 and 18 feet close around; near the SW. edge of Middle Ground a red buoy lies in 18 feet water, with church belfry, near Government house, bearing NW. by N., and east extreme of Swallow cay NE. by E.

Supplies.—Fresh beef and pork, of fair quality, can be obtained, also vegetables and fish.

Preserved meats are obtainable in small quantities. A considerable quantity of bread and flour can be had, at 10 per cent. advance over New Orleans prices.

Water is obtained from tanks, with which every house is furnished; it is supplied to vessels by the consignees. In the rainy season, the water of the river becomes drinkable at a short distance above the bridge, but in the dry months it is not wholesome within 14 miles of the town. There are also some wells on Water cay, at the entrance of the ship channel, about 9 miles from the town. During the wet season there is a very heavy fall of rain in this locality; as much as 37 inches has been recorded in one 24 hours, during a heavy NE. gale.

Coal.—There is no coal on shore, but good Welsh coal may be obtained from the London Steamship Company, which occasionally sends out a sailing vessel loaded with it; the vessel remaining here until discharged by the steamers as they arrive. The cost is about $10 per ton (gold), the lighterage additional.

Lights.—English cay is similar in formation to Goffs cay, and has upon it a mast painted white, from which, at an elevation of 45 feet above high water, is exhibited a *fixed white* light, visible in clear weather from a distance of 7 miles. From the light, cay Bokel bears SE. by S., 13 miles, and the northwest point of Turneffe, NE. ½ N., 19 miles.

On a flagstaff on the custom-house, near the south entrance point of the river, is shown a *fixed white* light.

Southern Grennels or ship channel.—The entrance of the ship channel leading into the harbor from the eastward lies between English and Goffs cays. The latter is very small and sandy, with some

bushes, and SE. by E. ¼ E., ½ mile, from it, is a dry sand bank. The channel is from 800 to 1,200 yards wide, with depths of from 10 to 30 fathoms, but it is so extremely tortuous, and sharp in its turns, that strangers should obtain a pilot at Half-moon cay.

Buoys.—Sand Bore anchorage buoy is painted red, and is moored on the edge of the channel, with English cay bearing SW., and Goffs cay, N. ½ W.

Water cay spit is marked by a red buoy, in 29 feet, with the southeast end of Water cay bearing NE. ½ N., and English cay SE.

NE. Spit.—This spit has a black buoy at its extremity, in 4½ fathoms, with the south extreme of Water cay bearing ESE. ¼ E., and Spanish Look-out cay, NE. ¼ E.

White Grounds Spit is marked by a red buoy, in 3¼ fathoms, with the south extreme of Water cay, E. ¾ S., and Spanish Lookout cay, NE. by E. ½ E.

Spanish Cay Spit has a black buoy, in 21 feet, with the Lunatic Asylum bearing N. by W. ¾ W., and Robinson point, W. ¾ S.

One Man Cay Channel is marked by a red buoy, in 2¼ fathoms, on the south end of the northern spit, with Robinson point bearing W. ½ S., and the Lunatic Asylum, N. ¾ W.

Directions for Belize.—Vessels approaching from the northward should keep an offing of at least 3 miles from the cays, to avoid the main reef which skirts them. The sand bank at the entrance should also have a berth of at least a mile, to avoid the doubtful shoals SE. of it. When English cay bears W., steer for it, until Goffs cay is seen open to the eastward of Water cay, thence steer into the channel.

When Spanish Look out cay is seen open to the westward of Water cay, round the first red buoy on the end of Water cay spit. The curves of the channel will now be best kept by paying attention to the buoys placed alternately on each side of the channel; passing them about 400 yards distant. Vessels of light draught may cross the flat in 14 feet, with Goffs cay in line with the south extreme of Water cay; the bottom here is very soft. From One Man cay channel, a large vessel should steer NW. ¾ N. 1 mile, then N. ¼ W. for the anchorage; in this track she will pass near or over shoals of 3½ fathoms.

Anchorage.—Vessels overtaken by the night, or wanting a pilot, or wishing only to communicate, instead of remaining under sail, will find temporary anchorage, in 5 fathoms, on the north side of the entrance of the channel, with Goffs cay nearly in line with Curlew cay, N. ¼ W., and the Sand bank, NE. ¾ E, ½ mile distant.

Tides.—The time of high water is uncertain; the rise is about 1½ feet, but is much influenced by the winds. There is no tidal stream, but generally a slight outset.

Inner or main ship-channel.—Vessels leaving Belize for the purpose of loading off any of the rivers to the southward or eastward, proceed by a navigable channel between the cays on the outer reef and the main, passing out in the latter case to the southward of the Zapatillas.

The coast, from Belize, trends, with but a slight inward curve, south, 24 miles, to Colson point. About 7 miles from Belize the land becomes firm, and reaches the northern boundary of the pine barrens, which are never overflowed. The shore is low, and the tops of the trees are from 60 to 80 feet above the sea; but at about 12 miles it begins to rise in rounded hummocks, and at the distance of 15 miles from Belize, and 4 miles from the shore, is a hill, called the Dolphin head, which is a conspicuous object from the offing.

All along, from abreast the Grennel cays, which lie about 4½ miles from the coast, the 3-fathom line is about 1½ miles distant, whence the depths gradually increase to 9 and 10 fathoms in mid-channel, and up to the west side of the cays on the reef 12 miles distant.

Colson point is a round, prominent, bluff headland, on the parallel of Glory spit, which is 15 miles distant.

Sibun river flows out of a large lagoon to the northward of it, about 6 miles from Belize. This stream is of considerable magnitude and next in commercial importance to Belize; its banks being extremely fertile and studded with plantations.

Manati, Mullins, and Salt rivers.—At 12 miles southward of Sibun river, and SE. from the Dolphin head, is the entrance of the Manati. About 7 miles farther south Mullins river empties; and 2½ miles beyond this, at the bottom of a small bight 1½ miles westward of Colson point, is the mouth of Salt river.

North Standing creek.—From Colson point, the coast trends S. by E., 7 miles, to North Standing or Indian creek. There is here a settlement of Caribs, which is divided into three villages nearly connected, the northernmost called Scotsman town, the southernmost Man-of-war town. This stream is generally so full and rapid that the water is fresh just within the mouth; it is, therefore, a good watering-place; it must be taken, however, above the washing and bathing places, and the casks must be rafted. A vessel may anchor in 4 fathoms, within less than ½ mile of the entrance of the creek; still it is not so convenient as South Standing creek.

Tobacco Cay channel.—Abreast North Standing creek, at the distance of 8 miles, are the Sand-fly and Garbutt cays, between which and Tobacco range to the southward, is the Tobacco cay channel, carrying 13 feet water. Between the cays and this part of the main the channel is quite clear, with 8 to 11 fathoms water.

The coast from North Standing creek continues on the same line of direction about 2 miles, whence it curves to the southwestward, forming a bay 2 miles deep, which terminates at the entrance of the Sitte river, at 10 miles southward of the creek.

Cockscomb mountains.—The Dolphin ridge of hills terminates abreast North Standing creek. To the southward of this there is an extensive plain of pine barrens, from 50 to 100 feet high, bounded by the Cockscomb mountains, which, at the distance of 15 miles to the westward of the Sitte, reach an elevation of about 4,000 feet.

Sitte river.—The entrance of the Sitte is readily known by the land projecting in a well-defined point, close off which is a small islet. In front of the entrance is a dry sand-bank, and the river empties by a channel each side of it; the northern channel has 5 feet on the bar, the southern is only passable to canoes; within the bar there are from 12 to 15 feet water. On the north side of the point there are some huts, and $2\frac{1}{2}$ miles southward of the small islet is a village. Abreast the Sitte, the Blue Ground cays are about $5\frac{1}{2}$ miles distant, but some shallow ledges westward of them contract the channel to $3\frac{3}{4}$ miles. There is good anchorage, in 4 fathoms, with Sitte island bearing N. by E., $\frac{3}{4}$ of a mile distant.

Zapatillas lagoon.—From the Sitte river, the shore curves to the southwestward, and $3\frac{1}{2}$ miles from Sitte island is the entrance to Zapatillas lagoon, which will admit coasters. A small river flows into the south end of the lake, the water of which is fresh not far up. On the west side of a creek, at the north end of the lagoon, at the back of the village before mentioned, there is a well.

South Standing creek reaches the sea $2\frac{1}{2}$ miles southward of the entrance to Zapatillas lagoon. There is a large settlement of Caribs at the entrance and along the banks.

Water.—This river discharges so large a body of water, that, at times, it is fresh just within the mouth, and is a most convenient place to water, when wanting a large supply. The bar, however, is too shallow for large boats, and the casks must therefore be rafted.

Anchorage may be taken up in 4 fathoms, about $\frac{1}{2}$ mile to the eastward of the entrance.

The coast from South Standing creek trends south, 4 miles, to Jonathan point; whence it takes a SW. direction, for 3 miles, and then south, $4\frac{1}{2}$ miles, to False point, forming False cay bight, which is about $1\frac{1}{2}$ miles deep.

The main channel, between Jonathan point and the Quamino cays, is 5 miles wide, with 11 fathoms in the middle. The 5-fathom line is about 1 mile from the coast; the cays are steep-to.

False cay.—Near the middle of the above bight, 3 miles from Jonathan point, and about 1 mile from the shore, is False cay. This narrow, low islet is about ½ mile long, NE. and SW., covered with bushes, and cocoa-nut trees, and at the north end are some huts. From the east side foul ground extends ½ mile, but the west side is steep-to, and the channel within it carries 5½ fathoms.

Water.—Snug and well sheltered anchorage will be found close off the west side, and abreast it good water may be obtained by digging wells.

Lark rock is a small coral head, with 4 feet water, situated 1 mile from Lark cay, with the SW. Bugle cay bearing SSW. ½ W., and the northeast extreme of Lark cay, SE. by E. There are 10 and 12 fathoms water close around this rock.

Placentia point is on the parallel of the Gladden spit, which is 22 miles distant. About 400 yards eastward of the point is a low, swampy cay, ½ mile in extent, the trees upon which are 50 feet above the sea. Here the cays on the main reef approach so near the coast as to leave the channel only 2½ miles wide; and between the two Bugle cays and the Potts shoal, 1½ miles southward of Placentia point, it is only 1½ miles in width; this is the narrowest part.

Potts shoal is a coral bank, 1½ miles in extent, north and south. At the north end there are 3 fathoms, with False point bearing N., and SW. Bugle cay, E. ¼ N.; and at the south end there are only 2 fathoms, with SW. Bugle cay bearing ENE. ¼ E., and False cay seen just open eastward of Placentina cay, N. ½ E.

Anchorage will be found, in 4 fathoms, with the east side of Placentia cay bearing N., and the SW. Bugle cay, ESE. ½ E. The trees on the latter are 70 feet above the sea. Near the huts on the beach at Placentia point there are wells of good water. In working out in a vessel of heavy draught, do not bring the SW. Bugle to bear northward of E. by S., until False point bears N. ½ W., to avoid the Potts shoal.

Placentia lagoon is about 9 miles long, north and south, and is only separated from the sea by a very narrow ridge of low land, over which canoes can be hauled; its breadth varies considerably. The entrance lies 1¼ miles westward of Placentia cay, and carries 5 to 10 feet water into the interior, where the depths are 4 to 6 feet.

Harvest cay, situated about 2 miles south from Placentia lagoon, has upon it a conspicuous, little, wooded table-hill 82 feet high. Elsewhere the trees are 50 to 60 feet above the sea.

Middle shoal, situated about 2 miles southward of Potts shoal, is ½ mile in extent, with 15 feet water; from this shoal Harvest cay hill bears NW. by N., 2½ miles, and the Bugle cays in line with the west end of Lark cay, NE. ½ E.

Penguin shoals, which lie 1 mile southward of the Middle shoal, are about 1 mile in extent, NW. and SE., with depths of from 3¼ to 2¾ fathoms at the northwest end, Harvest cay hill bearing NNW. The whole of False cay kept just open eastward of Placentia cay, bearing N. ½ E., passes clear, to the eastward of Middle and Penguin shoals, and over the shallowest part of Potts shoal. The channel between Penguin and Pantile shoals is 3 miles wide, the depths in which are very irregular, varying from 4 to 14 fathoms.

Monkey shoal.—This small head of 2¼ fathoms water lies about 3 miles, SSW. ½ W. of Penguin shoals, with Harvest hill, N. ½ E., and the huts at the entrance of Monkey river W. by S., 4¼ miles distant.

The coast, from Placentia lagoon to Monkey river, trends SSW. ½ W., 10 miles, and is everywhere low and swampy, and cut up by small creeks skirted by cays. From Monkey river to Negro head it trends, with a slight curve, SW. by S., 6½ miles. It here becomes more elevated, and is bounded by a beach; and Negro head rises to a conspicuous bold bluff. The shore is foul at the distance of about ¾ of a mile; and outside this, the soundings are everywhere very irregular. At 1¼ miles NNE. ½ E. from the head, lies a very small islet, named Bushy cay; and SSE. ½ E., 4½ miles, from the head, is the East Snake cay.

Monkey river, which has 2 feet of water over its bar, is a rapid stream in the rainy season, and the water is fresh near the mouth. Wood is shipped from an anchorage off it, but the neighborhood is dangerous to vessels drawing over 14 feet. A spit of foul ground extends to the eastward of the huts at the entrance, 1½ miles, and at this distance there are only 2½ fathoms, with Harvest hill just in line with the east side of Palmetto cay, NNE. Between the river and Monkey shoal there are also two banks, with 3 and 3½ fathoms water, and 7 fathoms between them.

Directions for main channel south of Belize.—The navigation of the inner channel, from Belize to Placentia point, both ways, presents but little difficulty or danger, for the land and sea breezes are leading winds; it is, therefore, only interrupted in the season of Northers.

Vessels generally leave Belize in the evening, in order to reach Placentia point early in the following morning, so as to have full daylight in threading their way through the narrows.

From abreast Grennels cay, at the distance of about 1 mile, the course and distance will be S. ¼ E., 27 miles, which will carry a vessel in midchannel, to within 3½ miles of the west side of the Cocoa-plum cays, in lat. 16° 53′ N. The depths ought to be 8 to 10 fathoms; if to the eastward of the course, the depth will be 11 fathoms, and will continue so close up to the cays, without any alteration; if to the westward, the depths will be less than 8 fathoms, and gradually decrease to the shore.

From the above point the course will be S. by W. ¾ W., for 23 miles,

to the entrance of the narrows, about 2½ miles NE. of the south end of Placentia cay. On this line the depths ought to be 10 and 11 fathoms, muddy bottom; in this part of the channel there will be 12 to 13 fathoms up to the cays, and gradually decreasing depths to the shore, which should nowhere be approached during the night within the depth of 7 fathoms.

It will not be safe to proceed farther to the southward without the advantage of daylight to see the shoals. The last course brings a vessel to within 1 mile of the Lark rock, which is so dangerous that it will be necessary to anchor several miles north of it, especially if the weather be unfavorable, as the soundings give no warning.

From the entrance of the narrows, with the south end of Placentia cay bearing SW., distant 2½ miles, the course and distance is SSW., about 25 miles; and when East Snake cay bears N. by W. ¾ W., 4½ miles, by keeping it on this line for 6 miles, a vessel will pass 3 miles westward of the SW. rock of the Zapatillas, and may then haul to the eastward.

After entering the narrows, the soundings are so extremely variable as to be of no assistance in the navigation.

Victoria channel.—By referring to the chart, it will be seen that a vessel bound northward, and being abreast East Snake cay, may haul to the NE., into Victoria channel. This route, though full of detached coral patches, is safe for vessels of large draught, with room to work, in 3½ to 4 fathoms water; it is, however, so tortuous, and out of the direct line to Belize, as to be only serviceable in case of necessity.

Tides and current.—There is no tidal stream in the inner channel, but generally a southerly current, which, after Northers or heavy rains, runs at the rate of 1 mile an hour or more. The rise and fall are irregular, and seldom exceed 1 foot.

General directions.—Vessels bound from the United States or Europe, to Belize, having entered the Caribbean sea through the channel to the south of Antigua, or the Mona passage, will run along the south sides of the Great Antilles.

Taking a departure from Jamaica at the Pedro bluff, a course should be steered so as to pass southward, and in sight of the Swan islands, which are visible from a distance of 12 to 15 miles. The current in this track will, in general, be westerly, at the rate of ½ to 1 mile an hour, as far as about the meridian of 81° W. off the Rosalind bank. Here it will most probably diverge to the NW. with increased strength, which will be readily detected by close attention to the latitude, which must be continually checked in approaching the islands.

From the Swan islands the track lies directly on the parallel of the Half-moon lighthouse, which must be strictly maintained by the same means. The current will here resume its westerly direction until within 50 or 60 miles of the Lighthouse reef, when it will draw again to the

NW. and N.; and too much pains cannot be taken to trace its devation and strength, for if the light is not made, very great risk and inconvenience may ensue.

Between November and March, or in the season of the Northers, a southerly set of 2 miles an hour has been experienced between Swan islands and Belize.

Having sighted Half-moon light, and received a pilot from the station at Half-moon cay, proceed to English cay, by passing to the southward of cay Bokel. In the event of having to wait for a pilot, a vessel may come to, temporarily, in the anchorage mentioned under Hat and Long cays. A vessel bound northward, to the United States or Europe, having discharged her pilot off Mauger cay light, should steer to pass westward of Chinchorro bank, and in daylight. Should the wind be scant, it will also be safer to pass between Cozumel island and the main, for there is always a dangerous in-draught on the east side of this bank and island. Indeed, an advantage will be gained by keeping in the northerly inshore stream, which runs off the northeast part of Yucatan, and along the eastern side of that bank at the rate of 2 knots, and at times even 3 knots. Thence the route lies through the Florida strait, described in Vol. I, Chap. II.

If proceeding to the eastward, especially in the rainy season, a vessel will of course haul out from Mauger cay and work to windward, according to the state of the winds and current; but no risk whatever should be incurred in attempting to weather the Chinchorro.

In the season of the breezes, when the trade wind hangs to the northward of east, and Northers prevail, it will be more advantageous to pass out between Turneffe and Glovers reef, and work up off the main in the eddy stream, but this requires very great care.

The coast, from Belize, trends in a northerly direction, for about 52 miles, to Rocky point, thence westerly, for 16 miles, to the river Nuevo, and then NNE., for 38 miles, to the head of Chetumal bay.

Chetumal bay, from its entrance abreast the south end of Ambergris cay, 25 miles from Belize, is about 58 miles long, north and south, and 7 to 12 miles wide. The land around is low, swampy, and densely wooded, except between the San José and Hondo rivers, where there are some cliffs of indurated red loam and moderately elevated land. Not far from the coast, nearly midway between these rivers, lies Tamalca island, within which there is good shelter for boats.

At the head of the estuary there is a stream of fresh water, which is said to communicate with Ascension bay. Between the south end of Ambergris and the main a mud bar extends across, named the Bulk head, from its perpendicular sides, which has only 5 feet water over it. Within the bar are channels with 8 to 12 feet water, leading into the interior of the bay, these channels are pointed out by stakes, and are only accessible to large flat-bottomed bongos, which convey the wood cut on the banks of the river to Belize.

Hondo river, situated about 10 miles northward of Nuevo river, is the northern boundary of Honduras, and is reported to be about 90 miles in length. The bar has 5 feet water, but is obstructed by many rocky heads which are not visible when the water is thick, and it is dangerous during the night. A short distance from the mouth, on the left bank, there is small military post; and about 7 miles up, an arm of the river branches off to the northward, and communicates with the Bacalar lake.

San José river, which enters the bay about 17 miles northward of Hondo river, is said to take its rise nearly 100 miles from the coast, and to drain the Bacalar lake. The bar has a depth of only 2 feet, and the entrance is marked by some low cays covered with rushes, which lie close to. Outside them there is a curious deep hole of 5 fathoms water.

Outer cays.—From the sand bank at the entrance of the main ship channel, to Belize, the edge of the bank extends N. by W., 13 miles, to St. Georges cay, skirting the Drowned cays at 1 to 2 miles, and is everywhere foul and steep-to.

St. Georges cay, situated about 2½ miles northward of the Drowned cay, N. by E. ¼ E., 8 miles, from Belize church, and 1½ miles from the edge of the reef, is half-moon-shaped, nearly ¾ of a mile long and 200 yards broad, low, sandy, and readily distinguished by the houses and cocoanut trees upon it. Being free of swamps and exposed to the pure sea breeze, it is a comparatively healthy spot, and consequently resorted to by invalids from Belize, but there is no fresh water.

Anchorage.—Abreast the south end of St. Georges cay there is a break in the reef, which affords an entry to anchorage close up under the west side of the reef for two or three vessels of moderate draught. It is exposed to the SE., but partially sheltered from that quarter by the Turneffe reef.

Directions for St. Georges cay anchorage.—In approaching the anchorage from the eastward, run in with Riders cay (the northernmost of the Drowned group) seen just open southward of the south end of St. Georges cay, bearing WNW. ½ W. Haul close round the south end of the reef, and anchor in 3½ fathoms, with the extremity of the reef bearing ESE., about 400 yards distant. In working out care must be taken to avoid a small patch of only 7 feet water, about ¾ of a mile to the southward of the anchorage, from which the south end of St. Georges cay bears NW. ¾ W., and Shag bluff, the east extreme of the Drowned cays, S. ½ W.

Corker cay.—The reef from St. Georges cay extends in a N. by E. ½ E. direction, 20 miles, to abreast the south end of Ambergris cay, without any opening, and is steep-to. At about 10 miles north of St. Georges is Corker cay, and between are Hicks and Long cays; Corker cay is 4½

miles long, north and south, and very narrow. There are some wells of good water on this cay. Between Corker and Ambergris, about 1½ miles from the latter, is Cangrejo cay. The edge of the reef is nearly 2 miles outside Corker cay.

Ambergris cay is 19 miles in length, north and south, 2 miles in breadth at the south, and 4 at the north extremity. It is low and swampy, and only separated from the main by a narrow boat channel, carrying 2½ feet water, which is so tortuous that the island appears as part of the mainland. From the south extreme of the island, the shore trends NNE. ½ E., 17 miles, thence NNW., 3½ miles, to the boat channel. The angle forms Reef point, which projects out very prominently and distinctly. The reef skirts the shore from ½ to 1½ miles off Reef point, whence it gradually approaches the land again; and at 10 miles to the northward it is ¼ of a mile off the coast.

The coast from Ambergris cay to Herrero point, at the entrance of Spiritu bay, trends N. by E. ½ E., 74 miles. It is steep-to, low, and flat, and the tops of the trees are from 60 to 80 feet above the sea.

Chinchorro or Northern triangles.—This very dangerous bank, lying immediately in the track of the homeward-bound vessels from Belize, is 26 miles long, north and south, and from 8 to 11 miles broad, with rounded extremities, its western side being 14 miles from the mainland. The greater part of the bank is bounded by a barrier reef, which, on the east side of Great cay, forms a most dangerous bight, as the current sets strongly into it, and over the whole of this side of the reef. H. M. S. *Griffon*, in December 1878, when off the south end of this bank, experienced an easterly current of 1¼ knots an hour.

At the north extreme of the bank there is a break in the barrier, and soundings extend outside it, ½ mile. At the south extreme of the bank, there are soundings for 1 mile SW. of Sand cay, with depths from 17 to 5½ fathoms, within ¼ of a mile of the islet. For a space of 3½ miles to the NW. of the cay the reef is broken, leaving several openings to the interior, which are navigable, by the eye, for fishing vessels. More accidents occur on this bank than at any other part of the coast of Honduras.

North cays, at the north end of the bank, 1¾ miles from the edge of soundings, are two low, narrow islets, lying close together, which occupy a space of ¾ of a mile, north and south, and the trees upon them are about 55 feet high.

Great cay.—In the middle of the bank, on a direct line between the cays at the extremities, 5 miles from the western edge and 2 miles from the eastern, is Great cay. This islet is merely a low ridge of sand, 2½ miles in extent, north and south, covered with button-wood, mangroves, and cocoanut trees, which reach a height of about 50 feet above the sea, inclosing a salt-water lagoon, 1 mile in length.

Sand cay, ¾ of a mile from the extreme south point of the bank, is a barren cay, about 100 yards in extent and 5 feet high, composed of indurated sand and bleached coral, in lat. 18° 23′ 20″ N., long. 87° 23′ 41″ W.

Sand banks.—On the northwest part of the bank are numerous sand banks, visible at a considerable distance by day, which may be seen even at night in favorable weather, from a short distance outside the reef.

Anchorage.—In moderate weather, and in case of necessity, a vessel may anchor between the Skylark and Blackford ledges, the latter of which is dry, in five fathoms, with Sand cay bearing ESE. ¾ E., about 1½ miles distant. There is also a small, clear space between the Blackford ledge and Wreck reef, where anchorage may be obtained, in 6 fathoms, with Blackford ledge SE. ½ S., distant ½ mile, and the Sand cay about SE. by E. ½ E. The edge of the bank must be approached very cautiously, for there is no room to shoot ahead. Elsewhere the reef is so steep that the lead will give no warning.

Spiritu bay.—The entrance to this large bight is funnel-shaped, and 4 miles deep, the outer part, between Herrero and Fupar points, on a north and south line, being 11 miles wide, and the inner part, between Owen and Lawrence points, only 2 miles across. From Fupar point a narrow reef, steep-to, extends to the southward, 5 miles, leaving between it and a similar reef extending northerly from Herrero point, an opening 1½ miles wide, carrying from 5 to 6 fathoms, into anchorage for small vessels in 15 feet water. The interior runs in a SW. direction for about 20 miles. A bar lies in front of the inner points, over which may be carried 6 feet water, but in a heavy swell it is not safe for boats; within, the depths are 16 to 18 feet, gradually decreasing to the shores.

Water.—On the southeast end of Owen island, near a conspicuous cocoanut tree, there is a well of good water; and 1¼ miles to the southward of it is a small fishing establishment.

Directions for Spiritu bay.—Run in with Owen point WSW. ½ W., and, hauling short round either of the reefs, anchor as soon as shelter is obtained. If to the northward—which will be the best in the season of the breezes—anchor with Lawrence point bearing WSW. ½ W., and Herrero point, S. by E., in 15 feet, about ¾ of a mile from the reef. If to the southward, for the purpose of watering, anchor in the same depth, with Owen point, W. by N., and Herrero point, S.

Ascension bay.—From Fupar point, the coast trends about N. by E., 8 miles, to Bird point, and then NW., 3½ miles to Wilson point, at the entrance of Ascension bay, which has four remarkable cocoanut trees upon it, 60 feet high. This bight also extends in a SW. direction, about 18 miles; and the swampy shores of the interior are so close to Spiritu

bay, that on the west side of Fupar point they are only separated by a sandy haulover, 300 yards broad.

The entrance, between Wilson and Allen points, is 8¼ miles wide, in a N. by W. and S. by E. direction; but nearly in the middle is a narrow cluster of mangrove cays, about 45 feet high, named Culebra, occupying a space of about 4 miles in a WNW. line, which serves to distinguish this opening from Spiritu. At the north side of them there is a single cocoanut tree.

The opening southward of these islets is 1¾ miles wide, and that to the northward 3⅜ miles across; both openings are obstructed by a bar, over which 8 feet may be carried between the cays and Allen point, but with much swell, it is dangerous to boats; in the center of the bay the depths are 11 and 12 feet, decreasing to the shores. A broken reef lies in a north and south direction, to seaward of the outer points, leaving a clear opening a short distance southward of Allen point, 2 miles wide, carrying 3 to 3½ fathoms, into anchorage for vessels of light draught, in 15 feet water, under shelter of either end.

Water.—There are several wells and ponds of good water at Allen point; and most excellent seining and hunting. The largest fishing establishment on this part of the coast is about 3½ miles westward of the point, and the huts are conspicuous objects at a considerable distance.

Directions for Ascension bay.—The anchorages here are more confined and exposed than those at Spiritu; it is, however, a more convenient place to water. With this view, all that is necessary is to run in with the fishermen's huts seen just open southward of Allen point, and hauling up close round the end of either reef, anchor in 15 feet, as soon as shelter is obtained from the prevailing trade breeze.

Tides.—The tides are irregular both at Spiritu bay and Ascension bay, but it appears to be high water, full and change, about 8h., and the rise 1 foot.

The coast, from Allen point, trends about N. by E., for 8 miles, to Blossom point or Boca de Paila. Here it forms a slight bend to the westward, and then takes a northerly direction, for 15 miles, to the Kilbride or Ynan cliffs. This spot is very remarkable, being the only part composed of cliffs on the whole of this coast line; they are about 3 miles in extent, and 80 feet high, and at the north end is the ruin of a large square watch-tower resembling the turret of a castle. Several more of these buildings will be seen between this and cape Catoche.

From the Ynan cliffs, the shore trends about NE. by N., for 62 miles, to Nisuc point, the south extreme of Cancun island, with scarcely any curve. It is all along so low that the tops of the trees are only about 50 feet above the sea, and a broken reef skirts it at the distance of about

¼ of a mile, with deep water close alongside; within the reef there is a channel for canoes.

Cozumel.—The northwest end of this island lies only 9 miles from the mainland, but its south end is 20 miles distant. It is everywhere low, and has a flat appearance, the uniform height of the trees being about 70 feet above the sea. From the south end, the east side extends in a NE. ½ N. direction, 24 miles, and is composed of small, sandy beaches, intersected by rocky points, from which soundings extend 1 mile. About 4 miles from the north point of the island, close to the beach, is one of those remarkable stone buildings similar to those on the main, and apparently in good preservation, but it is seen only a short distance; there are also two more a little farther to the southward, but completely in ruins.

Between the north and northwest points, a reef extends 1¼ miles. This end of the island is about 10 miles broad, from east to west, and the shore forms a sandy bay, about 1½ miles deep, backed by swamps and lagoons of brackish water. At the northwest point there is a fresh-water pond. From this end a large bank, of sand and weed, stretches off to the northward, the outer extreme of which lies NE., 11 miles, from the northwest point, and N. by W., 6 miles, from the north point. The depths at the outer part are very regular, decreasing from 17, to 4 fathoms on a line joining the entrance points of the bay; but within this line the ground is studded with small rocky heads. The eastern edge of this bank is clearly defined by the current ripplings, which, at times, have the appearance of breakers.

The west side of the island, from the northwest point, extends nearly straight SSW. ½ W., for 12 miles, when it curves SSE., 8 miles, to the south point, which is low, but well defined, with deep water close to the shore. There is a lagoon along the northern part of the island, and another near the south end, with narrow entrances difficult to find; these lagoons abound with fish.

Village.—This island is settled by Indians from Yucatan, and the population is about 1,500. The village, named San Miguel, is about 3 miles southward of the northwest point of the island. Cattle are plentiful, and poultry may be obtained; cotton is the chief product, tobacco and sugar-cane are grown in small quantities, and dye woods are exported.

Anchorage.—There is good anchorage in 6 fathoms, protected from the easterly swell, and out of the influence of the current, with the northwest extreme of the island bearing SW. by W. ½ W., and North point, E. ½ S. The water is so clear that the anchor may be seen lying on the sand. Vessels must be prepared to leave quickly in the Norther season.

The current runs strong between Cozumel and the main land, to the northeast, showing a ripple along the Cozumel bank, which is also denoted by the lighter color within the edge.

Arrowsmith bank is oval-shaped, 14 miles long, NNE. and SSW., and about 5 miles broad, with depths of 12 to 25 fathoms on coral bottom. The south end lies 27 miles, NE. by N., from the north point of Cozumel, and 18 miles from Nisuc point. The north end is 11 miles from the edge of the Yucatan bank.

The current runs over Arrowsmith bank, to the northward, at the rate of 2, and even 3 knots, and the south end is marked by strong ripplings.

Cancun island is merely a ridge of sand hills, from 40 to 60 feet high, 7 miles long, north and south, and ¼ of a mile broad. From the north end it trends to the westward, enclosing a lagoon with 3 to 6 feet water, leaving a narrow canoe entrance at either end. Several fishermen's huts are scattered about the northern arm, and at the NE. point there are some wells.

Mugeres island, situated about 4 miles, NNE., from the north end of Cancun, and 5 miles from the nearest part of the main, is 4½ miles long, NW. and SE.; in the middle it is scarcely ½ mile broad, and the extreme ends terminate in distinct points. The southern portion is slightly elevated, and the tops of the trees are about 90 feet above the sea. At this extremity of the island there is one of those remarkable towers, about 10 feet square, before noticed; and at the opposite end there is a very conspicuous, square, black rock, 6 feet high, named the Anvil. The east side is composed of rocky shelves, so steep that there is no reef, and there are 6 fathoms water within ¼ of a mile of the shore. About the middle there are some white cliffs.

Becket rock, situated nearly midway between Mugeres and Cancun islands, is a very small, black rock, only 2 feet out of water, and steep-to on its east side, but to the NE. and SW. a narrow coral ledge extends about ½ mile, with depths of 3 and 3¼ fathoms.

Mugeres harbor.—The passage leading into this harbor, south of Becket rock, between it and the reef which extends from the NE. point of Cancun island, is ¾ of a mile wide, with 4½ fathoms water; on the north side of the passage there is a small coral patch, with 14 feet over it, from the south side of which Becket rock bears NE. ½ E., and the NE. point of Cancun island S. ¼ E. Between the north end of Becket ledge and Mugeres, the passage is 1½ miles wide, with depths of from 4 to 5 fathoms.

Water.—There are some wells at a sandy point at the northwest end of the island, and good fire-wood may be obtained at the southeast end.

Directions for Mugeres harbor.—The opening is so conspicuous that there is no mistaking it, and there is nothing in the way but the Becket rock, which is soon seen. The south end of Mugeres is steep-to, but it will be better to run down with a ruin near some small sand

hills on the main, bearing WNW. ½ W. These sand hills are only 15 feet above the sea, but about ½ mile WSW. of them, there is a clump of trees 85 feet high. The above course will lead in midway, and when the south end of Mugeres bears E. ½ N., and the NE. point of Cancun island, S. by E., anchor in 4 fathoms. In case of necessity, a vessel of large size might be warped into a secure pool, near the middle of the island, where there are 20 feet water almost alongside the shore. If intending to refit, run on until the Anvil rock is in line with Wells point, N. ¼ E., which line will lead up to the pool. Bear in mind, however, that the channel, though straight, is only 400 yards wide, where depths of from 17 to 27 feet can be carried.

In working out, when Becket rock bears S. by E, a vessel should not stand farther to the northward than to bring the southeast point of Mugeres NE. by E. ½ E.

Tides.—It is high water, full and change, in Mugeres harbor, at 9h. 30m., and the rise is 1½ feet. The northerly current runs through the opening, and between Mugeres and the main, at the rate of 1½ knots an hour.

The coast, from abreast the northwest end of Cancun island, trends about N. ½ W., 18 miles, and is composed of sand hills, scantily covered with brushwood, from 20 to 30 feet above the sea. About 11 miles from Cancun there is a narrow ridge of sand, only 7 feet high, almost separating a narrow neck of land, similar to that which forms Cancun, and which is generally known as Blanquilla island.

From the northwest end of Mugeres, a shallow ledge of coral and sand trends N. by W., about 5 miles, to within 1½ miles of Blanquilla, leaving a narrow channel inside, carrying 5 fathoms. The current running out over it causes a ripple, like breakers; but it has from 10 to 14 feet water. From the south end of Blanquilla a reef extends as far as Contoy, leaving one or two openings for boats.

Contoy island, situated near the northeast extreme of Yucatan peninsula, in lat. 20° 32′ N., long. 86° 49′ W., is 4½ miles long, NNW. and S SE., and ½ mile broad. The east side is composed of a narrow ridge of sand hills, covered with bushes and small trees to the height of about 65 feet above the sea, to within 1½ miles of the northwest point, when it forms a low, narrow ridge of land, off the extremity of which are two small rocks. The shore is skirted at the distance of 200 yards by a reef nearly dry, which is connected to the Blanquilla reef. From the northwest rocks a narrow ridge of coral extends in a NNW. direction, with depths of from 3 to 3½ fathoms. The greater part of the west side of the island is cut up by numerous small lagoons, filled with fish.

Water.—There is a well near the northwest end, but the water is not so good as that found at another at the south end of the island, which is used by the fishermen. Good fire-wood may also be obtained on the east side.

Anchorage.—After the season of Northers, good anchorage will be found under the west side, in 3½ fathoms, sand and weed, with the northwest point bearing E., about 1 mile distant. It is exposed to the NE. breeze, but the ledge shelters it in this direction.

Caution.—In approaching the anchorage from the eastward, in a vessel of heavy draught, care must be taken to avoid the northern ledge, for the soundings give but little warning. The 10 fathom line passes close to this ledge, and when westward of it, the depths will be 6 and 7 fathoms, the west extreme of the island bearing SSE.

Tides.—It is high water, full and change, at Contoy island, at 9h. 30m., and the rise is about 1 foot.

Las Blancas Lagoon.—The soundings gradually decrease to the westward and southward, until they reach, in the latter direction, numerous shifting sand legdes, nearly dry in many places, leaving narrow channels, carrying 10 to 12 feet, into the Las Blancas lagoon. This inlet, which lies between Blanquilla and the main, is 10 miles long, from 2 to 3 miles in breadth, and affords secure shelter to vessels of 8 feet draught. A small stream, named Blancas river, flows into the south end, which admits canoes to a short distance, where the water becomes fresh. At the west side of the entrance, close to the main, is Lucio cay.

The coast, from Lucio cay, trends NW. by N., 7 miles, thence in a more westerly direction, for about 9 miles, to the east end of the Yalahau lagoon. This part is more elevated and densely wooded, the tops of the trees being from 120 to 130 feet above the level of the sea; it is also fringed with mangrove cays, between which are canoe channels leading to small fishing villages, both on the cays and the main.

At that part where the coast trends to the westward there is the ruin of a large church, which is the only remarkable object in this neighborhood, being very conspicious when the sun shines upon it from the eastward. It bears W. ½ S., 9 miles, from the north point of Contoy, and, from this quarter, the chimney, which is forked at the lower part, will be seen just above the trees. From the northward, the ruin is visible until brought to bear SSW. ½ W., when it is hidden by the wood; and from this direction it has the appearance of a hip-roofed building, with a high chimney at its west end.

Cape Catoche.—About 3½ miles to the NW. of the ruin, there is a large opening, named the Bocas de Joujon, leading into the east end of the Yalahau lagoon. Jolbos island, to the westward of this, is 15 miles long. The entrance of the Bocas is pointed out by some cocoanut trees on the east side, and some huts on a little sandy cay just within it. About 5 miles from it, and 16 miles, WNW. ¾ W., from the north point of Contoy, the shore forms a round, and tolerably distinct, sandy projection named cape Catoche; it is the extreme northeast point of the coast, and in lat. 21° 36′ N., long. 87° 5′ W.

CHAPTER XI.

GULF OF MEXICO—CAPE CATOCHE TO THE RIO GRANDE DEL NORTE.

Gulf of Mexico.—The extent of this great gulf, from east to west, between the coast of Florida and the Mexican coast, on the parallel of 25° N., is about 850 miles, while its width, north and south, varies from 375 to 675 miles. This chapter describes the shore of the gulf, from cape Catoche to the Rio Grande del Norte, a distance of upwards of 1,100 miles; it is, however, so devoid of shelter that only one harbor presents itself capable of receiving vessels of 18 feet draught. The sea boundaries of the provinces about to be described are those of Yucatan, Tabasco, Vera Cruz, and Tamaulipas, which form the southern boundary of the gulf.

Winds.—On the coast of Vera Cruz, and between that anchorage and Tampico, the trade-wind prevails from ESE. and E., in April, May, June, and July; and in the night the wind comes off the land from S. to SW.; should the land breeze come from NW., with drizzling rain, the wind on the following day will blow from N., NNE., or NE., especially in August and September. These are the *Vendavales*, or head winds, and as they are light, and raise no sea, it is as easy to take the anchorage off Vera Cruz with them as with the trade-wind; but they are contrary to a vessel leaving the anchorage, which is easier effected with the land breeze. These head winds extend only from 60 to 90 miles from the coast, where they meet with winds from E. and ESE. From the middle of September to March, great care is required in anchoring at Vera Cruz, on account of the very strong north winds.

Although in the gulf of Mexico, which is partly situated within the tropic of Cancer, it cannot be properly said that any other than the trade-wind prevails, still the interruption given to that general wind by those from the north, in the months from September to March, seems to divide the year into two seasons, the wet and the dry, or those of the trade-winds and the Northers. The wet season, in which the trade-wind blows without interruption, is from the vernal to the autumnal equinox; and the dry season, in which the north winds blow, lasts from September to March.

Dry or north wind season.—It is usually in the month of September that the first north winds begin to be felt; but neither in it, nor during October, do they blow with much force. It happens, sometimes, that in these months they do not blow at all; but then the trade-wind

is interrupted by violent squalls and torrents of rain. In November the north winds set in, blowing constantly and very strongly, lasting all through December, January, and February.

During these months, from the time the north wind is felt, it increases in strength for four hours or more; by that time it acquires its greatest violence (which may last for 48 hours), continuing for some days in a moderate degree, but at other times only lasting a few hours. In these months the Northers bring dark weather, and are apt to draw to the NE. They recur so frequently that the interval between them varies only from four to six days. In March and April, Northers are not so frequent, nor do they last so long; the weather is also clearer; but they blow with much more violence during the first 24 hours of their continuance, than in the other months, and draw less to the NE. From November, when the north winds have commenced, the weather in the intervals between the gales is fair and pleasant, the trade-wind blowing regularly by day, and the land breeze by night.

The approach of the north winds may be known by various signs, some time before they come on. These signs are a calm after a steady SE. or S. wind; moisture on the walls of the houses and pavement; having a clear view of the peak of Orizaba, and the mountainous ridge of Perote and Villa Rica; the ranges and slopes of San Martin covered with a whitish haze; an increased heat in the weather, and a low, thick fog proceeding rapidly from the South; the barometer, however, although its range is small, is still the best guide to depend upon.

This instrument, during the north winds at Vera Cruz, varies in its height only $\frac{8}{10}$ of an inch, that is to say, the mercury does not rise above 30.6 inches, nor sink below 29.8 inches; its usual height is 30.1 inches. The barometer indicates the approach of a Norther by the falling of the mercury; but it does not really begin to blow until the mercury again rises, which it always does a few minutes before the wind comes on. Flashes of lightning then shoot along the horizon, particularly in the NW. and NE. quarters; a glittering appearance on the sea, and clouds breaking up in the NW., with birds flying southward, give sufficient warning not to trust to the weather, for the Norther will infallibly soon begin to blow.

The wind generally moderates at sunset; that is, it does not blow with such strength as from 9 a. m. to 3 p. m., excepting when it happens to begin in the afternoon or at nightfall; for, in such case, it continues with increasing violence, regardless of this rule. It sometimes happens that after nightfall, and even after midnight, the north wind changes to the land breeze, or veers to the NW. Should this take place, and the wind come round to SW. at daybreak, then the Norther will be of no long continuance, and at the usual hour the sea-breeze will come on. Should this change not take place, however, then at sunrise, or a little afterwards, or at the beginning of the flood tide, the Norther will again

begin to blow with as much force as it did on the preceding day; it is then termed a *Norte de Marea*, or a Tide Norther.

The most certain indication of the Norther ceasing is when it shifts to the NE. quarter; for when in the afternoon it draws to the NE., although the following morning should set in dark and cloudy, if the land breeze blow in the night-time from the SW. quarter, the trade-wind will certainly blow in the afternoon, and the weather will be fair for four or six days, which is the usual interval between the return of the Northers. Should the wind, however, after changing to NE. again draw back to the NNE. or N., no confidence ought to be placed in the weather.

Instances are not wanting of violent Northers occurring in May, June, July, and August; they are known by the appellation of *Nortes del Hueso Colorado*, and those that are less violent by the name of *Chocolateros;* such occurrences are, however, very rare.

Warnings.—The northers are preceded by a change in the trade-wind, which shifts to SE. and S., accompanied by a moist atmosphere, and a slight fall in the barometer, giving generally a day's warning; sometimes, however, there is a notice of only a few hours. This change is followed by a dark cloud rising in the western quarter, whence the Norther suddenly commences; afterwards drawing round gradually to N. and NE., with a rising barometer, and blowing hard, with squalls and rain, for several days. It is observed that the wind at this period never backs, but veers regularly round the compass, from east through south.

Wet season.—The rainy or trade-wind season commences in the gul of Mexico in March, and lasts till September; at the end of March, and during April, the trade-wind (occasionally interrupted by the North winds), blows from ESE. rather freshly, sometimes accompanied by clear, and at other times by cloudy weather; occasionally it draws a little to SE., blowing the whole night through, without giving way to the land breeze, which usually is experienced at night, and is the strongest when the rains have set in.

From the time when the sun crosses the zenith of Vera Cruz, until its return from the north (that is, from the 16th of May to the 27th of July), the trade-wind is interrupted by calms, with much thick weather, and occasionally short but severe squalls; even after that period light winds are often experienced from NW. to NE.

From the end of July to the middle of October, when the North winds set in, the squalls are more violent, accompanied by heavy falls of rain, with lightning and thunder; the heaviest squalls come from the east, although they last the shortest time; calms also occur in these months.

In the season of the trade-winds the total range of barometer is only 0.50 of an inch; the greatest height of the mercury being 30.40 inches, and the least 29.90 inches. The thermometer in the trade-wind

season ranges from 83° F. to 89° F., but in the season of Northers it may fall to 40° F.

Currents.—The currents in the gulf of Mexico appear to form a complete circle around the shores. After passing across the bank of Yucatan, the stream takes a southwesterly direction towards Vera Cruz, and then turns to the northward as far as the vicinity of the Rio Grande del Norte. From thence it travels eastward, and, meeting with the outflow from the Mississippi, is diverted to the southeast.

The limits and velocity of the stream are, however, very uncertain. As might be expected, in the center of this great basin there is seldom any set whatever. The eddies outside the main current run in all directions, and are greatly influenced by the strength and direction of the wind.

Yucatan, the shores of which form a part of the southern boundary of the gulf, extends from the Rio Hondo, on the east, to the Usumacinta or Rio Palizada, which empties into the southwest end of the Laguna de Terminos, on the west. The northern portion of this peninsula, from the base of the table lands of Guatemala, on the parallel of about 19° N., is an arid, scantily wooded, sandy plain, elevated only a few feet above the sea, and so dry that the inhabitants have to depend on rain water, caught in tanks and reservoirs.

Water may, however, be obtained by digging wells on the shore, but it is not considered wholesome. At Yalahu and Silan, on the northeast coast, are some most remarkable springs, which will be pointed out further on.

Winds and seasons.—The wet and dry seasons are distintly marked, as elsewhere on this sea, but the north shore, being so far removed from the influence of the high lands of the isthmus, the rains are here somewhat less violent, and do not commence before June, and droughts occur.

In the dry season, off the northeast end of the peninsula, there is a continued heavy dew, both day and night, producing a disagreeable feeling of chill. Sometimes it is so dense as to resemble fog, and prevent a boat being seen beyond ½ mile, and on these occasions the temperature of the surface water will be 10° above that of the air.

At this period the sea breeze sets gradually in from the NE., at about 10 a. m., and at 12 it is blowing fresh. Between 4 p. m. and sunset it draws round to the eastward, and at midnight the land wind is blowing moderately from the SE. These changes frequently extend to a distance of 40 miles from the shore. In the month of June, however, within 8 or 9 miles of the coast, the land wind will rush off in a sudden heavy squall in the afternoon, but it seldom lasts long. Calms seldom occur in these months.

Off the northwest end, and west side, of the peninsula, from about 10 a. m. to 2 p. m., the interval of the change from the land to the sea

breeze, the wind falls gradually to nearly a calm, and as gradually springs up again from the north, and at about 3 p. m. is established at NE. At midnight the breeze slackens, and shortly after, the land wind comes off from the eastward. At about 4 it is fresh from ESE., and so continues until about 10 a. m., when it gradually subsides as above. It may be observed, however, that as the western shore is approached, the sea breeze sets in to the westward of north, and the land wind settles at SE.

It is remarkable that the barometer will fall nearly a tenth of an inch as the sea breeze sets in, and rise to its usual level with the land wind, although sometimes the latter blows the strongest.

Off Campeché, the land wind will sometimes blow fresh, and in heavy squalls from SE. to SW., until 11 a. m.; it then gradually lulls, and, drawing round to the westward, meets the sea breeze coming in from the NW., at about 1 p. m. In the middle of April these changes may be interrupted, for 24 hours, by a strong westerly wind and heavy rain.

Off the north shore, Northers may be met with as late as the middle of April, but they seldom occur after March, and their force is then considerably diminished. On these occasions, two days previously, the barometer may begin to fall, and sink two-tenths below its former level as the change approaches, the wind falls light from the ESE., the atmosphere becomes dense, and exceedingly moist, the scud low and flying, and the upper clouds run rapidly to the NW. A few hours before the change, heavy masses of dark clouds appear to the westward, and the wind rushes down from that quarter, with the strength of a treble-reefed topsail breeze, accompanied with rain, thunder, and lightning. Immediately after the first squall, the barometer will rise rapidly, even to as much as three-tenths of an inch above its previous level, although the wind may not fall, and draw round to the usual direction, for a couple of days.

This change is often followed by a dense fog, for two or three hours after noon, when objects are scarcely visible a mile off.

On that part of the coast of Yucatan between cape Catoche and point Piedras, and thence southward to Campeché, the NE. trade generally prevails, interrupted by strong north winds during their season. After the Northers, until June, the breeze is moderate with fine weather. Squalls from NE. to SE., which set in after noon, are then experienced; they last about an hour, and when evening approaches the serenity of the atmosphere is quite restored.

This season of squally weather continues to September, and during the whole of this period, along the coast, sea breezes blow from NNW. to NE. It is observed that the fresher the sea breeze is the more violent are the squalls. The sea breeze sets in about 11 o'clock in the forenoon, and in the night draws round to E., ESE., and SE., when it may be considered as a land breeze. These changes are also felt on the west side of the peninsula, during the moderate breezes of April, May, and June.

Tides and currents.—On that part of the coast of the gulf of Mexico described in this work, the tides seem to be governed by no known laws, but the rise and fall, small in amount, appear to be influenced to a large extent by prevailing winds. It frequently happens that the level of the sea remains stationary for some days.

Between Contoy and the Corsario banks, the ebb runs so strong to the eastward, as to overcome the general current by a knot an hour. In the month of June it will reach out as far as 45 miles to the northwestward of cape Cotoche, and to near the eastern edge of the bank, which will greatly assist a vessel working to windward.

It may be useful to repeat that from cape Cotoche to Sisal, and to the distance of about 40 miles from the coast, the set is westerly, from ½ to 1 knot an hour. Outside this line it takes a northwesterly direction, and becomes more feeble as it approaches the edge of the bank, where it is almost entirely lost.

Off the west side of the peninsula, there is seldom any stream whatever, outside the tidal limits.

Cotoche shoals.—From cape Cotoche, the shore of Jolbos island trends westerly, with a slight bend, 15 miles, to Francisca point, thence SW., 5 miles, to Palmas point, the west end of the island. From the Bocas de Joujon to Palmas point, a distance of 23 miles, the shore is skirted by many sand and coral ridges, some of which, being covered with red and green kelp weed, give their tinge to the water, and point them out. These ridges extend 8 miles northward of cape Cotoche, with 3 to 4 fathoms water, 4¾ fathoms between, and 6 fathoms outside. From Francisca point, they extend to the northward, 10 miles, with 14 feet, and at 5 miles, NNW., from that point, there is as little as 9 feet water.

These ridges are probably the Corsario shoals of former charts, and the rock said to have been seen in 1789; also that reported by the *Grecian*, off the north end of Contoy, as that part has been thoroughly explored. In passing this part of the coast, a vessel should not come within the depth of 10 fathoms, which lies only from 1 to 2 miles outside the shoals.

Yalahau lagoon.—Between Jolbos island and the main is the Yalahau lagoon, which is 17 miles in length, east and west, and about 4 miles wide. At the west end, on the main, S. by W. ½ W., about 2¾ miles from the west end of Jolbos, there is a scattered village; at the east end of it there are the remains of a small fort.

Water.—In the sea, not far from the beach, and off the ruins of the fort, there is a remarkable spring of excellent water, which runs with great force at all periods; boats can row into it and fill casks therefrom. Two or three small rivulets also flow into the eastern part of the lagoon, which help to form an extensive bar across the opening, between the west end of Jolbos and the main, named the Boca de Conil, on which there are not more than 3 or 4 feet of water.

Anchorage.—There is a very good anchorage outside the bar, in 4 fathoms, with Francisca point, which forms the northwest extreme of Jolbos, bearing E. by S., and the village, S. by E. ¼ E., about 8 miles distant, which, however, will be scarcely visible from the deck of a vessel. Some care should be taken to bring up on this latter line, as it guides a boat over the deepest part of the bar.

Caution.—In approaching the above anchorage, from the eastward, very great caution must be observed, and more than ordinary attention paid to the lead, for there is nothing whatever remarkable on the shore to guide a stranger. The safest way is to make the land well to the westward, and sight the Monte de Cuyo, and work up; standing in to 4 fathoms until the white buildings in the village are sighted from the mast-head.

The coast from Yalahau trends westerly, 16 miles, to the Monte de Cuyo. About 2 miles from Yalahau village there is a large grove of trees, 90 feet high; and 4 miles farther westward there is another, still more elevated and conspicuous. From thence to the Monte, lofty trees disappear, and the low, sandy shore is scantily covered with brushwood.

On the west side of the last grove a small stream enters the sea, and on the west side of the entrance is the rancho of Chipepte; but the huts are not seen more than 3 or 4 miles off. From the Monte de Cuyo, the coast trends WNW. ½ W., 15 miles, where are seen 2 or 3 huts, and thence W., 15 miles farther, to Rio Lagartos. It is all along low, sandy, and covered with dwarf palmetto trees, and presents no remarkable object whatever, until 8 or 9 miles to the eastward of the Lagartos. Here it becomes more wooded; and 5 miles farther to the westward will be seen, through a grove of cocoa-nut trees, the lookout tower and village of Lagartos. Between the mount and the huts, the soundings are regular to a depth of 4 fathoms; but from the huts to the Lagartos the depths are very irregular, and it is not advisable to come within the 5-fathom line.

Monte de Cuyo is a small, but remarkable, conical hill, about 40 feet high, covered with brushwood; it stands close to the beach, and is supposed to be an ancient tumulus. Abreast it there is a landing place and a few huts, whence is shipped the produce of the interior, and more conveniently than off Yalahau.

Anchorage will be found abreast the above huts in 4 fathoms, about 2 miles from the shore.

Rio Lagartos.—From abreast the lookout tower* of Lagartos, the shore bends slightly to the southward of west, to the entrance of the

* The lookout towers, or "vigias," we shall have occasion to notice hereafter, are square structures of open framework, built of large timbers to the height of 40 or 50 feet above the sea. Some are strengthened by cross-frames; they have ladders to reach the top, and are remarkable objects on this coast.

river, which is difficult to recognize, as it opens to the westward. Although termed a river, this place is a lagoon, navigable for canoes, about 10 miles in length, east and west, and 2 to 2½ miles in breadth. The village is situated on the narrow ridge of land that bounds the north side of the basin. On the south shore are some cultivated salt ponds, the produce of which is conveyed in large bongos to Sisal; the bar, however, is so shallow that they are obliged to load out side.

The coast, from the Lagartos lagoon to Yalkubu point, 22 miles distant, trends W. ½ S. The land in this part is firmer and more elevated than any other part of this shore. About 6 miles eastward of Yalkubu point, the tops of the trees are 170 feet above the sea. At the point there is a rancho of two or three huts; but thy are difficult to recognize among the trees.

From the rancho, the shore bends to the SW., for about 13 miles, to Arenas point, forming a foul bight, which should not be approached within the depth of 5 fathoms, and even then with very great attention to the lead.

Pawashick shoal, on which the British bark of that name grounded, in 1881, lies in lat. 21° 31′ 30″ N., long. 88° 46′ W., about 17 miles northeastward of Santa Clara, and west of Yalkubu point. The shoal appears to be of small extent; 1½ fathoms were found where the vessel grounded, and from 2¾ to 3¼ fathoms close to.

Coast.—On the east side of Arenas point is the entrance of a large swamp; and from the point the shore trends W. ½ S., 6 miles, to the village of Silan; which, although surrounded by trees, is pointed out by its lookout tower.

Water.—There is here one of those remarkable springs rising in the sea a short distance from the shore; the water is collected in the hollow trunk of a tree placed over it. The quantity is small, and, without good management, rather brackish, but it is used in seasons of drought.

Anchorage.—There is a very good anchorage about 4½ miles from the shore, in 4 fathoms, with the village of Silan bearing SSE. ½ E., and the lookout station of Sta. Clara, SW.

The coast, from Silan to the rancho of Kopte, distant 55 miles, runs W. by S., presenting an unvaried, low, sandy shore, slightly wooded, with here and there a clump of trees, about 30 feet high; it is all along backed by swampy ground. There are several lookout stations and ranchos in this space, from which scanty supplies of stock and vegetables may be procured.

About 7 miles to the westward of Silan, is Sta. Clara, which may be known by a single hut and a lookout tower, the latter rising above the neighboring trees, being somewhat conspicuous; and 4 miles farther on is Sinanché, distinguished by a solitary hut on the beach.

At 8 miles to the westward of Sinanche, is Telchac. There is a good road between this place and Mérida, the capital of the province. To the westward of Telchac, 9 miles, is a lookout tower, and a rancho of a few huts, named Yxil, in a grove of cocoanut trees. At 5½ miles farther on is another rancho of several huts, also surrounded by cocoanut trees, near the beach, called Huai-muum; and about 7 miles more to the westward is the town of Progreso, near which are four cocoanut trees, with a remarkable grove of large trees at the back, 80 feet high.

Progreso, in lat. 21° 17′ N., long. 89° 39′ W., and occupying the site of the ancient village of Tuxulu, has, since the year 1872, been the only port of entry on the Yucatan coast.

The town standing directly on the beach, from which a wooden pier 100 yards long extends, consists of some 300 houses. The population is about 1,500. A narrow-gauge railroad connects Progreso with Merida, the capital of Yucatan, about 20 miles distant and extends 20 miles beyond the latter, to the town of Ticul.

Supplies.—Supplies are abundant; but water is scarce, and of indifferent quality. The exports are hemp, hides, hair, deerskins, logwood, and mahogany. Five steam vessels call during a month, two from New York, one from England, one from France, and one from Havana.

Directions for Progreso.—As the wind and current are both usually from the eastward, care should be taken not to fall to leeward when approaching the port. In the daytime the land should be made about point Yalkubu and at night the 5-fathom line should, in vessels of moderate draught, be struck 10 miles to the eastward of Progreso.

The huts and cocoa-nut trees at Yxil show out well at the distance of 4 miles; but the shore thence to Huai-muum is so low as to appear disconnected at the distance of 4 miles. Huai-muum is well wooded, and interspersed with low white houses; it forms a good mark.

When approached from the eastward, Progreso appears as a long street of white houses, extending inland. These, with the custom-house, a lofty, white, square building near the pier head, render the town easily recognizable.

Light.—From the northeast corner of the custom-house, a *fixed white* light is exhibited, at an elevation of 57 feet above high water, and is visible in clear weather from a distance of 12 miles. The light apparatus consists of an oil lamp placed in a lantern on the top of the lookout shed.

Anchorage.—The best anchorage off Progreso is in 4 to 5 fathoms, sand, with the custom-house bearing S. by E. ½ E., distant 4 miles.

Coast.—About 2 miles farther on is the rancho of Yax-actun, which contains the only large wooden building on this part of the coast, and points it out at once. To the westward of this the coast becomes more

wooded, and 2¾ miles from Yax-actun, is a rancho named Chelem. About 2 miles from thence is San Andres, which has only one hut, on the top of a sand-bank; and a little beyond it is a remarkable clump of trees.

Continuing to the westward, at 3½ miles, is the village of Chuburnà, readily known by the lookout tower near it, which has a small round-topped hut within the lower part of the frame. At 2½ miles from the lookout tower of Chuburnà, is the rancho of Cheventun, and 1½ miles farther on is that of Kopte, which has a single cocoa-nut tree near it. In this neighborhood the groves of trees become more lofty, and reach a height of about 80 feet above the sea. When abreast Kopte, the town and fort at Sisal, 10½ miles distant, may be seen. From Silan to Sisal the soundings are regular, and the shore may be approached, in safety, by attention to the lead, observing that the depths will decrease very rapidly within the 5-fathom line, which runs along at the distance of about 5 to 7 miles from the coast. From a height of 12 feet, the tops of the trees may generally be seen 10 miles.

Sisal is situated on the beach. A wooden pier, 25 feet wide, extends out 250 feet, which enables boats to land with ease and unload, until the full strength of the sea breeze sets in. At the inner end of the pier, on the west side, the landing is guarded by a small semicircular water battery of three guns, which is commanded by a square fort behind, generally termed the castle. The entrance to the latter is on the south side, about half way up the wall, and on the north parapet are two guns.

Light.—The walls of the castle are 30 feet high, and within them is a tower, from which is exhibited a *fixed* light, about 60 feet above the level of the sea, visible 10 miles.

Supplies.—There is a public well near the inner end of the wharf, but the water is only used for cattle and washing; rain water caught in tanks, supplies the inhabitants, and there is seldom any to spare. Poultry is abundant, but the beef is very inferior and scarcely eatable. Vegetables are very scarce. Firewood may be purchased, and it will be better to have it brought on board in the native bongos.

Anchorage.—The most convenient anchorage lies with the castle bearing SSE. ½ E., choosing the depth according to the draught of the vessel, observing that the soundings are regular to 3 fathoms at about 1¼ miles from the shore.

Caution.—The arming of the lead will show a bottom of sand and clay, but it is only a thin layer over a flat rock. The holding ground is, therefore, very bad, and it is necessary to cockbill the anchor and ease it down, otherwise the flukes are very likely to break. This warning applies to all the anchorages on the north coast, except at Contoy. Observe also that after the sea breeze has set in, which occurs about noon, communication with the shore is extremely difficult and inconvenient.

Sisal shoal is a coral bank ¾ of a mile long, north and south, and ½ mile broad, lying NW. by N., 12½ miles, from Sisal fort. At the south end of the shoal there is a depth of only 9 feet water, with 4 fathoms close around it, and 6 fathoms 300 yards to the south and west. For about ¾ of a mile to the eastward of it there are small patches of 4½ fathoms water, with 6 and 7 fathoms between. At about 600 yards to the northward of it there is another patch, of 2½ fathoms, with 3 and 4 fathoms between the two. If pursuing an inshore route, with Sisal in sight, a depth of less than 6 fathoms will avoid this shoal. There are 6, 7, and 8 fathoms east and west of it, for 6 miles, with 9 and 10 fathoms at ¼ of a mile to the northward of it; the soundings give no warning in the latter direction. The discolored water over the shoal may be seen from aloft in favorable weather.

Madagascar reef, so called from the English frigate of that name having grounded on it, in 1837, lies NW. ¾ W., 9½ miles, from the Sisal shoal, and the center is in lat. 21° 26′ 30″ N., long. 90° 19′ W. This dangerous ledge of coral is 1¼ miles in length, east and west, but only 100 feet in breadth, which will account for its having remained so long unknown in a part so generally traversed from east to west. On the east end of it there are 12 feet water, and on the west end only 9 feet, with 17 and 18 feet between. Off the north, east, and west sides, there are 12 fathoms close alongside. Off the south side, and between it and the Sisal shoal, there are regular depths of 10 and 11 fathoms, on sand and coral. Being covered with seaweed of the same color as the water, and not breaking, it is not discovered by the eye; a vessel should, therefore, never attempt to pass between it and the Sisal shoal, without the latter has been first seen; and in approaching it from the east, north, or west, should not shoal into less than 15 fathoms.

Snake rock.—While searching for Madagascar reef, in the English brig *Snake*, a single cast of 4 fathoms was said to have been obtained 8 miles to the westward of it, but it could not be found again, although a very close examination was made, for several miles around, by Captain Barnett, when surveying Madagascar reef.

The coast, from Sisal to Piedras point, trends W. by S., 4 miles, thence SW. ½ W., 16 miles, to Palmas point, which forms the NW. extreme of the Yucatan peninsula. From this point it curves SSW. ½ W., for 10 miles, to Celestun, and then S. ½ W., 62 miles, to Campeche.

Between Sisal and Celestun, the features are precisely of the same character as before, being composed of low sand-banks, scantily covered with bushes and dwarf palmettos, and here and there a clump of trees from 50 to 80 feet high. It is all along bounded by a white sandy beach, and it is so even that it is difficult to trace out either Piedras or Palmas point.

The soundings, within the depth of 5 fathoms, are irregular and suspicious. With the castle at Sisal bearing SE. by E. ½ E., distant 6½ miles,

there is a small patch of coral of only 20 feet, which should be avoided by not coming into less than 6 fathoms, until it is passed. Several shoals are reported to exist, near the 5-fathom line, off Palmas point.

At 16½ miles, W., from Celestun, there is also a sand ledge, with 4½ fathoms over it, and 6 fathoms around. From the entrance of the Salinas to the southward of Celestun, the shore is low and swampy, and skirted by mangroves, for a distance of 25 miles, when it becomes more firm, and the trees more lofty.

After passing the little rocky islet, 30 feet high, off Piedras point, 23 miles from Campeche, small settlements will be met with. About 7½ miles from Campeche, the mangroves form a distinct point, whence the shore curves to the eastward, and forms a slight bay, the south part of which is bounded by the first elevated land seen on this side of the peninsula, and which is from 180 to 200 feet above the sea. Any further minute description of the western coast would be quite useless to general navigation, for the shallowness of the water prevents vessels of even light draught from sighting the land to the northward of Campeche.

Celestun is a small village of about 20 huts, standing in a grove of cocoa-nut trees near the beach. About 5½ miles to the southward of it is an opening leading to extensive cultivated salt ponds, which, with those at Largartos, yield sufficient to supply not only Yucatan, but Mexico, with that article. Near the landing at the village of Celestun, there is a well of good water, which, however, affords but a scanty supply in the dry season. Firewood may be procured in small quantities on the beach a short distance southward of the village.

Light.—A light is shown at Celestun. The light is *fixed white*, visible from a distance of 10 miles.

Campeche is the second city of importance of the province of Yucatan, and, with its extensive suburbs, contained, in 1850, upwards of 18,000 inhabitants. It stands on the shore, enclosed at the back by a small amphitheatre of hills, and at the distance of 1¼ miles to the NE., is overlooked by fort San José, and at 1¾ miles to the SW., by fort San Miguel.

It is walled in and entered by four gates, and the main road along the shore from Lerma is guarded by fort San Luis, which is directly beneath fort San Miguel. From the sea gate a wharf extends about 150 feet, but the water at the extremity is so shallow that heavily laden boats cannot lie alongside with unusually low tides, and vessels drawing more than 10 feet water cannot come abreast the town.

Supplies.—There are a few springs in the town, but the water is not good, and the inhabitants depend upon that which is collected in tanks during the rainy season. Vessels requiring a supply, will find a well,

conveniently situated at the Soler cattle farm, on the road, about 1 mile to the eastward of Lerma.

The market is open during the morning, and is well furnished with meats and vegetables.

Light.—A *fixed white* light is shown from the town of Campeche, at 95 feet elevation, and is visible 14 miles.

Directions for Campeche.—In approaching Campeche from the northward, after rounding Palmas point, the lead will guide, and by keeping in 5 or 4¾ fathoms, the ridge of hills at the back of the town will be sighted at the distance of about 14 miles, bearing SE. by E. ½ E. The city, lying so low, is not seen at more than 9 or 10 miles, and not even at this distance without the sun shines on the cupolas of the churches.

Should the land be made before the 5-fathom line is reached, the first remarkable object seen will be the look-out tower (not, however, without the aid of a glass), which stands on the highest part of the ridge, 320 feet above the sea, SW., 3 miles, from the city, and 1½ miles to the NE. of Lerma. Having brought the look-out tower to bear E. ½ S., it should be steered for, and anchorage taken up as most convenient to the draught of the vessel, with the cathedral bearing E. ½ N., which will enable the boats to sail to and fro with the sea breeze.

In fine weather, a vessel drawing 13 feet may go to within 4½ miles of the town, by bringing the eastern cathedral to bear E., and Lerma church SSE.

Lerma.—At 4 miles south of Campeche is the village of Lerma, inhabited chiefly by fishermen. It is readily distinguished, at a considerable distance, by the large, white church which stands in the center, especially when the sun shines on it from the westward. Landing may be effected here at almost all times, with a little care; the best spot is just to the southward of an old dilapidated fort, a short distance from the church, but it is necessary to anchor the boat and back her on to the beach, as there is generally a heavy surf with the sea breeze.

Water.—There are some wells in Lerma, but the supply is very small in the dry season. The best water will be found at the cattle farm before mentioned, a mile to the eastward of the church.

The coast, from Campeche to Morros point, trends SW. ½ W, 9 miles, along the base of the ridge of hills, which at the latter points forms a bold wooded headland of some extent, 423 feet above the sea. On the summit there is a little hillock, which is a remarkable object from the southward, but not so from a westerly direction. About 6 miles southward of Morros point is Punta Seiba, and to the southeast of that, 1 mile, is the village of Seiba Playa, which has a large church similar to that of Lerma.

Anchorage.—To the southward of Lerma the shore becomes more bold, and may be approached with confidence, by proper attention to the lead. A vessel of 18 feet draught may take up good anchorage, about 3 miles from Morros point, with Punta Seiba in line with a remarkable hill inland, bearing SE. by E. ½ E., and the cathedral of Campeche seen just open of Lerma.

Campeche or Yucatan bank.—The north and west sides of the Yucatan peninsula are skirted by a bank, which gradually increases in depth from the coast, and may be said to extend from 2 miles abreast Nisuc point, NNE., for 32 miles, to lat. 21° 30′ N., and 20 miles east of Contoy, thence in a northerly direction to its northeast extreme, in lat. 23° 28′ N., long. 87° 12′ W.

From the northeast extreme the edge trends westerly, 100 miles, but a slight projection reaches its northern extremity in lat. 23° 50′ N., and long. 88° W. From the west end of the line, it trends, with only a very slight inward curve, SW. by W. ½ W., 220 miles, to the northwest extreme, in lat. 22° 5′ N., long. 92° 17′ W. From this point, the western edge takes a southerly direction, for about 70 miles, and then runs about SSE., to the parallel, and within 90 miles, of Campeche; beyond this point we have no accurate knowledge of its limits.

It has hitherto been stated that the depths, as well as the quality of the bottom, are so very irregular, that it is not possible to ascertain the situation of a vessel, by the lead, with any degree of certainty. A single glance at the present chart, however, will show quite the contrary, and that the lead alone, properly attended to, will ensure safe navigation. Off the north coast, from the Bocas de Conil to Palmas point, the 5-fathom line is from 5 to 7 miles distant, the 10-fathom line is from 12 to 18 miles, the 20-fathom line is from 32 to 38 miles, and the 30-fathom line is from 60 to 80 miles.

Off the west coast, from Palmas point to Campeché, the 5-fathom line is from 8 to 18 miles off, the 10-fathom line is from 20 to 35 miles; the 20 fathom line is 60 miles WNW. of Palmas point, and thence runs along at about the same distance; and the 30-fathom line runs along at only a few miles from the edge of soundings. It is very remarkable that the outer dangers lie on the outer edge of the 30-fathom line, and that beyond them the depth suddenly increases to 40 fathoms and upwards.

Northern shelves.—On the northeastern part, however, as far to the westward as the Alacran bank, a space of 150 miles, the depths gradually increase outwards, from the 30 to the 50 fathom line, which is only a very short distance from the north and east edges. The only variation occurs at the north extreme of the bank, between the meridians of 88° 40′ and 89° W., where there are two coral patches, with very irregular depths, over discolored water, with as little as 11 fathoms, which may serve as good points of departure. The bottom elsewhere

is chiefly sand, shells, and coral, but the two first are probably only a very thin covering to the coral, for the holding ground is not good. A remarkable feature at this part is the sudden change of color in the water, as pointed out on the chart; but we cannot affirm that these spots are stationary.

Fishing.—The attention of the mariner is drawn to the fishing grounds pointed out, which would amply repay a couple of hours' delay by an abundant supply of the finest rock fish and red snappers; wherever the bottom is coral and shells, or seaweed, success is almost certain.

Iphigenia rock, the existence of which is doubtful, is said to have 8 feet water on it, and is placed on the charts in lat. 21° 58′ N., long. 88° 36′ W. The West India Pilot, Vol. I, gives the latitude as 21° 50′ N.

Granville shoal.—Mr. Granville, commanding the steam vessel *Dallam Tower*, 1882, reports having passed over a shoal in lat. 21° 54′ N., long. 89° 19′ W., obtaining a least depth of 4½ fathoms; the shoal is composed of sand, broken coal, and small stones (apparently volcanic); the sea broke heavily over the shoalest part, and the soundings increased gradually to 6, 7, 9, and 11 fathoms, thence suddenly deepening to 20 fathoms. Also that a shoal patch of 7 fathoms exists about 10 miles northward of Granville shoal.

Alacran reef, the north easternmost danger on the Campeche bank, lies N. by E., 73 miles, from Sisal fort; and Perez cay, at the south end of the reef, is in lat. 22° 23′ 36″ N., long. 89° 42′ 19″ W.

Its general form is that of a half-moon, convex to the NE., the straight western face trending NNW. ½ W., 14 miles, and its greatest breadth is 8 miles. The weather, or northeast, side is composed of a compact mass of coral, dry in many places, over which, on all parts, the sea breaks with terrific violence. The lee side, similar to all reefs of this character in these seas, is composed of detached coral heads, with some dry sand banks, and deep water between, which are easily seen.

At the SE. extreme of the reef, there are three small, sandy cays, about 5 feet high, covered with grass and brushwood. Pajaros and Chica lie only ¼ of a mile apart, and the former is 800 yards from the extremity of the reef. Perez, the other, lies nearly 1½ miles to the westward of Chica, and is a narrow ridge of sand about ½ mile long, NE. and SW. There are generally some fishermen's huts on the northeast end of Perez, the tops of which are 11 or 12 feet above the sea.

Between Perez and the other cays, there is an excellent reef harbor for small vessels, into which 4 fathoms may be carried, but the piloting must be done entirely by the eye.

At 3 miles, NW. by N., from Perez, there is a small cay, also pointed out by a hut; and the same distance southward of the northwest end of the reef there is another islet, 10 feet high.

The bank is everywhere so steep-to that there is no safe anchorage

for a large vessel, not even on the lee side, and the only clear landing place is on the inner side of Perez cay.

The approach to this shoal, when working to windward, requires more than ordinary attention, as the soundings near it do not give sufficient warning. As already stated, the north end lies on the edge of the 30-fathom line, but there are 40 fathoms only 2 miles distant. This end should, therefore, be carefully avoided in the night, more especially as a patch of 4 fathoms is said to lie 4 miles from the reef. The soundings, from close to the reef, to a distance of 40 miles to the eastward, on the parallel of its center, are from, 30 to 33 fathoms, on fine, gray sand; and with the reef bearing from NE. around by north to NW., the depths are from 25 to 30 fathoms, for a distance of 20 miles off. In passing to the southward of the reef, a vessel will have an excellent guide in the 20-fathom line, which lies 32 miles S. of it. Should the latitude be uncertain, it will be better to keep in not more than 25 fathoms, which will be found 17 miles off.

Tides and current.—The time of high water, at Perez, is uncertain; the rise and fall is about 2 feet. The current generally sets towards it, from the eastward, at the rate of a knot; but for some distance off the west side a strong eddy will be found running to the northward.

Cay Arenas.—This islet, and the rocks and shoals about it, occupy a space of 2 miles, east and west, and 1¼, north and south. The eastern part is a detached, solid barrier reef, convex to the NE., a little more than 1 mile long, NW. and SE., and ½ mile across. At the southeast end is a heap of broken coral, 7 feet high. The northwest end lies NE. ¼ N., ½ mile, from Arenas cay, and the opening between has 8 to 12 fathoms.

About 400 yards from the southeast end is a narrow, detached ledge, nearly dry, about 700 yards long, north and south; and 600 yards to the westward of it lies another, with 2 to 3 fathoms water, the west end of which lies SSE. ¼ E., 1,200 yards, from the west side of cay Arenas; in this opening the depths are also from 8 to 12 fathoms.

Cay Arenas, having on it a beacon, lies on the southeast end of a detached coral reef, also convex to the NE., about ¾ of a mile in extent. It is 300 yards long, north and south, and about 200 yards in breadth, covered with grass; at its southeast end a wall of bleached blocks of coral has been thrown up by the waves, to the height of 18 feet above the sea, visible 8 or 9 miles. In the months of April and May the cay is covered with birds, and seals will often be found there. There is a good landing place on the beach on its northwest side, in lat. 22° 7′ 10″ N., long. 91° 24′ 54″ W.

To the eastward of cay Arenas, at a distance of 25 miles, and just to the southward of the 30-fathom line, is a narrow ledge of coral, with general depth of 25 fathoms, and 30 to 33 fathoms close to the southward of it. At 19 miles, ENE. ½ E., from cay Arenas, there is a patch of only 16 fathoms.

Anchorage.—A snug anchorage, for small vessels, will be found between the forks of the reef, off the northwest side of cay Arenas, and there is good shelter, in 7 to 10 fathoms, between the cay and the east reef, but the holding ground is not good. The entrances to the latter are clearly pointed out on the plan, and require no explanation.

Caution.—These shoals lie within 12 miles of the edge of soundings, and are so steep-to that the lead will give no warning in the night. In the day-time they may be freely approached, as the cay is visible from a distance of 8 or 9 miles. The nearest edge of the 20-fathom line is 36 miles SE. of it.

Cay Nuevo is the northwesternmost, and smallest, of these outlying reefs, and lies 18 miles from the extremity of the bank, in lat. 21° 50′ N., long. 92° 5′ W. It is about 600 yards in diameter, and near the center is a heap of sand, with large blocks of bleached coral, 4 feet high, and about 120 feet in extent. In 1838 some coral stones were piled to the height of 12 feet. The reef breaks all around; but after a long interval of fine weather, landing may be effected on the cay, through a cut on the south side. From the north side a coral ledge extends in that direction, nearly ½ mile, with depths of from 3 to 10 fathoms at the end; elsewhere it is steep-to.

English banks, situated ESE., 5 miles, from cay Nuevo, are two banks of coral and sand, separated by a very narrow channel with 21 fathoms water. The east bank is about 5 miles long, north and south, and 3 miles broad, with depths of from 11 to 19 fathoms. The west bank is 5 miles in length, east and west, and 3 miles in breadth, with generally the same depths; but at the north end, with cay Nuevo bearing WNW. ½ W., 8½ miles, there are only 5 fathoms, upon which the discolored water is easily seen.

Caution.—The English banks are safe warnings in approaching cay Nuevo from the eastward, but from other quarters the reef is very dangerous. The 20-fathom line is 35 miles, ESE. of the banks, and there are 26 to 28 fathoms, over white sand, close up to them.

The Triangles are two coral reefs, separated by a clear space 6 miles wide, with depths of from 20 to 28 fathoms, over coral and gray sand.

The Western reef is only about 700 yards in length, and upon its southwest end is a cay, about 200 yards in extent, composed of sand and white coral stones, which form a wall on the east side, 11 feet above the sea, steep-to. This cay is in lat. 20° 58′ N., long. 92° 19′ 30″ W., 8 miles from the edge of soundings, and S. by W. ¼ W., 54 miles, from cay Nuevo.

A very narrow coral ledge extends to the NE., 2¾ miles, from the above reef, with depths of from 6 to 9 fathoms; and 1¼ miles farther out another ledge extends in the same direction, 1½ miles, with 7 fathoms, which is so narrow, that in standing across it there is barely time for a second cast of the lead.

The Eastern reef extends NE. and SW., 3 miles, being nearly dry, and ½ mile in breadth. It will be observed that the shape of this reef is a remarkable exception to all others in these seas, for instead of being convex to the NE., it is straight in that direction. Very near the middle, however, there is a cut, 400 yards wide, with depths of from 7 to 10 fathoms, so that it may be described as two reefs. At the northeast side of the cut is a cay of coral stones, 200 yards in length, 100 yards broad, and 17 feet high, with a heap of stones upon it, 24 feet above the sea. There is a tolerable landing at a sandy point on the northwest side of the cay, with the land and sea breezes. At ¼ of a mile NE. of the above, there is a small, low, sandy islet.

On the southwest portion there are three or four dry rocks, and at the extreme end a sand-bank, 3 feet above the sea. A narrow coral ledge extends from both extremities, on the line of the reef, which stretches to the NE., 1 mile, carrying 9 to 14 fathoms, and to the SW. ¾ of a mile, with 5 to 8 fathoms.

Caution.—The soundings to the north, south, and east of these dangers for a considerable distance are so regular as to give no warning; but from the SW., at the distance of about 8 miles, they will suddenly decrease from upwards of 40 to 27 fathoms, on mud. To the westward there are 30 to 40 fathoms, within 1 mile of the northwest cay. There is very little or no current in this vicinity.

Captain Barnett, R. N., states that while searching for the Spey bank, reported to have been seen to the northward of these reefs, breakers were reported 1 mile from the ship, and for an hour there was distinctly the appearance of a reef, ¼ of a mile long. Both Triangles being in sight, its position was of course accurately determined, but a light air and heavy swell prevailing, its examination was deferred for a few days, when nothing of it was found. From after experience, there can be no doubt that this alarming appearance arose from the gambols of a large shoal of seals, which abound on this bank; and in the months of April, May, and June, the cays are sometimes covered with them.

Obispo shoals.—These two dangerous ledges of coral and sand lie on the very edge of soundings, and occupy a straight line 5 miles in extent, N. by E. and S. by W., and ½ mile broad, having between them a channel 1½ miles wide, with 28 fathoms water. The general depths on both shoals are from 4 to 10 fathoms; but on the middle of the northern edge there is a patch of 18 feet water; and 3 miles from it, at the north end of the southern ledge, there is a still more dangerous spot, of 16 feet water. The northern spot lies in lat. 20° 29′ N., long. 92° 14′ W., S. ¼ W., 26 miles, from the beacon on the East Triangle, and NW. ½ N., 21 miles, from the sand-hill at the Arcas. Neither of them breaks, but the discolored water over them may be seen at the distance of ½ mile.

Caution.—As usual, with all these dangers, the soundings give no immediate warning from the eastward, and 27 to 29 fathoms will be carried right up to them. From the westward, they are still more dangerous, for there are 80 fathoms 2 miles off, and upwards of 35 fathoms ½ mile from the south end.

Arcas cays, the southernmost on the bank, are a group of three islets, which, with their reefs, occupy a space 2¼ miles in length, NW. and SE., and 1½ miles in breadth.

Middle cay, the northern and largest, is ½ mile long, north and south, and 400 yards in breadth, and is composed of sand, which rises at the south end to a hill, 21 feet high, scantly covered with grass and bushes; but it cannot be seen more than 5 to 6 miles. It lies on the southeast end of a reef, convex to the NE., which, skirting the east side at a very short distance, curves round to the northwestward, for 1 mile, and always shows itself. The space to leeward of the reef is foul, but a boat may pick her way easily to a landing on the west side of the cay.

East cay is 400 yards long and 200 yards broad, and the broken coral of which it is composed is heaped up to the height of 10 feet. It lies upon a detached reef, ½ mile long, east and west, 600 yards to the SE. of Middle cay, and between them the depths are 6 to 10 fathoms. There are 10 fathoms 1 mile southward of the cay, when the depth rapidly increases to upwards of 20 fathoms in that direction.

West cay lies on the east end of a detached reef, ½ mile long, east and west, ¾ of a mile to the westward of Middle cay; and is merely a small heap of broken coral, about 6 feet high. The reef on the west side forms a fork, which gives shelter to a landing place that lies in lat. 20° 12′ 30″ N., long. 91° 59′ 38″ W.

Anchorage.—With the usual land and sea breezes there is anchorage on the west side, between the ends of the north and west reefs, in 6 or 7 fathoms, with the East cay seen just open southward of Middle cay, and West cay bearing SSE. ¼ E. The holding ground, however, is bad, and there is no safe shelter for large vessels in Northers.

Caution.—The Arcas lies about 8 miles from the edge of soundings, and 18 miles from the 20-fathom line; but eastward of them, for 7 or 8 miles, the depths vary too little to afford warning in the night. A vessel approaching them from the westward should be extremely careful not to get into less than 30 fathoms.

New bank is a flat ledge of sand and coral, 7 miles in length, ESE. and WNW., and 3½ miles in breadth, upon which the depths only vary from 9 to 11 fathoms. To the eastward of it the soundings increase to 20 fathoms, at the distance of about 3½ miles, but elsewhere there are from 23 to 27 fathoms, close to. The center lies in lat. 20° 32′ N., long. 91° 53′ W.

Pear bank, so named from its shape, is 8 miles long, NW. and SE., 2 miles broad at its south end, and 4 miles at its north end. The south end is only 4 miles to the northward of the west end of the New bank; and the soundings between are 23 and 22 fathoms, on coral and sand. The general depths on the Pear bank are from 13 to 19 fathoms, but they are irregular, and the north end is bounded by a narrow ledge of only 9 to 10 fathoms, with 27 fathoms close alongside; this marks the difference between it and New bank, which it is extremely important to notice when making use of them for a departure. The depths to the eastward of the bank gradually decrease from 23, to 20 fathoms at the distance of 20 miles.

Caution.—The above banks are most useful guides to the inside navigation, but, as said before, great care must be taken not to mistake one for the other, for the shallowest parts are 10 miles apart.

Doubtful dangers.—Besides the dangers which have been described, six others have been reported, and are to be found on old charts, off the northwest side of Campeche bank; they have, however, with one exception, been expunged from the latest charts.

Argus rock, the northeasternmost of the above dangers, is said to have been discovered in July, 1818, by the commander of the Spanish brig *Argus*, who stated that, being in lat. 24° 2′ N., long. 89° 43′ W., a breaker was seen on the beam, which appeared to be on a bank about 300 yards in extent. The sea at the time was very smooth, and there was but little wind. This shoal is also said to have been seen in November, 1800, by Señor Riera of the merchant vessel *Catalina*, in his passage from Campeche to New Orleans, but his longitude (which is not given) was deduced from dead reckoning.

Villabonesa rock.—This rock, reported to have been discovered in 1806, is described as being 50 yards in extent, with breakers upon it. At less than 200 yards from it, no bottom was found at 70 fathoms. Position as given lat. 23° 25′ N., long. 89° 56′ 30″ W., which is about 20 miles from the edge of the bank, on the meridian of the Alacran reef.

Negrillo.—This shoal is spoken of by all who navigate these seas, but no one has been able to give its exact position. One authority (of very doubtful reliability) says that it is a rock, about half a boat's length in extent, upon which the sea breaks, with no bottom around it at 120 fothoms. The only position given is lat. 23° 02′ N., and long. 90° 10′ W. Blunt says that it does not exist.

Bozo rock.—This danger was reported in 1817 as being about 500 yards in extent, NE. and SW., and at 600 yards from it no bottom at 64 fathoms. At the time of the discovery, the wind was light, and the sea so smooth that the heavy breaker over it could not be mistaken, and the ridge of rocks was seen extending its whole length. Latitude, as given, 24° 6′ N., and longitude 91° 6′ 10″ W.

Bermeja island.—This island is found on all the old charts in lat. 22° 33′ N., long. 91° 22′ W., but its existence is more than doubtful. The officers of the Spanish navy, in their search for the Negrillo, saw nothing of it, neither did another officer who purposely looked for it in 1804. Captain E. Barnett, R. N., also closely examined this neighborhood in 1844, without meeting with anything.

Cabezo or Cabeza shoal, is described as lying SW. ½ W., 13½ miles, from the Arcas cays, with only 1 fathom water over it, but the vicinity was closely examined by Lieut. Comdr. F. M. Green, U. S. Navy, in 1874, and no indication of the existence of such a shoal was found. A depth of from 60 to 100 fathoms was found in every direction within 5 miles of the alleged position, the depths gradually and regularly increasing to the westward. This shoal is still carried on the chart.

General directions for Campeche bank.—Vessels entering the gulf of Mexico, either from the Florida channel or Caribbean sea, and bound to the southern parts of it, should endeavor, by all means, to strike the eastern edge of the Campeche bank between the parallels of 22° and 22° 30′ N. To do this, no opportunity must be lost, night or day, to check the latitude, in order to detect the point where the north current is first encountered. In general it will be on about the meridian of 85° 40′ W., 50 to 60 miles from the bank; the velocity will be from 2 to 3 knots, and the course will have to be altered to the southward accordingly.

A knowledge of the exact point where the bank is entered upon is a matter of much importance, especially in the rainy season, when the atmosphere is very adverse to astronomical observations, in order to check the longitude, which cannot be so easily done afterwards, on account of the regularity of depth from east to west. The lead, therefore, must be early and often used. The edge of soundings generally shows itself by ripplings, and, at only a short distance within it, the water becomes discolored; and the temperature of the surface of the water will fall a degree, if entering well to the southward.

In the season of Northers, if bound to Vera Cruz, it will be better to take the outer track, that is, to pass between Madagascar reef and the outer cays, and this is done in safety by keeping between the depths of 17 and 20 fathoms. Being abreast Madagascar reef, in long. 90° 20′ W., a W. ½ S. course should be taken, so as to obtain a good departure from the 20-fathom line, in about lat. 21° 30′ N., long. 91° 20′ W., whence the same course (W. ½ S.) will lead about midway between cay Nuevo and the Western Triangle. A good opportunity will again occur of taking a fresh departure from the 30-fathom line.

Should a vessel be overtaken by a Norther, before she has cleared the bank, her position may be readily checked by the 20 or 10 fathom line, for great pains have been taken to define these lines on the chart, with this view. It will be seen that the distance from the 20-fathom

line to Madagascar reef is 14 miles, to the Alacran 32 miles, and to the Arenas 34 miles. The space between the 20 and 10 fathom lines is generally from 18 to 20 miles in width, and the latter is from 12 to 15 miles from the coast.

If proceeding to Campeche, after passing to the westward of the Madagascar, a vessel should haul gradually round to the southward, into about 5 fathoms, and then follow the directions already given.

In the rainy season, between May and September, when calms prevail, and observations are interrupted for several days together, it will be better to take the inshore route, in order to have the advantage of the regular land and sea breezes which prevail at this period. In this case, after passing the shoals off cape Catoche, the depths of 8 to 10 fathoms should be maintained to Chuburna, which place ought to be sighted, and thence keep in 5 or 6 fathoms, to avoid the Sisal shoals. To the westward of this the track will be again between the 5 and 10 fathom line, until southward of the Arcas, when the bank may be left, as most convenient, for the port where bound.

A vessel bound easterly from the southwest part of the gulf, will make her passage more rapidly, by passing over the Yucatan bank within the shoals, where she will have the advantage of the daily change in the breezes, than in navigating to the northward of it.

With the above view, it will be most prudent to enter on the bank to the southward of the Arcas, and by no means to pass to the northward of lat. 20° N., in the night, before reaching the depth of 20 fathoms. As already stated, all the outer dangers lie on the edge of the 30-fathom line, which should be most carefully remembered.

Some good authorities state, that when the latitude is uncertain, if the bank be entered northward of the Arcas, it will be discovered by the bottom being sandy, whereas to the southward of them it is clay; and that if it changes from clay to gravel, and sand or rock, in more than 25 fathoms, it is an infallible sign that you are near some shoal; it would, however, be extremely hazardous to depend altogether upon this remark. Both to the northward and southward of the Arcas, for a distance of 12 or 14 miles, the bottom is generally mud or clay and fine gray and brown sand, mixed with black specks; indeed gray mud resembling clay will be found close up to the Obispos and Triangles.

The safest guide is the 20-fathom line, and the estimated distance from it, bearing in mind also, that after Northers there is a strong current to the southward along the western side of the peninsula, at times, as much as 18 miles in 24 hours.

All that we need further add is, that the passage between the Sisal shoals and the coast should be taken in daylight, and by taking advantage of the diurnal breezes, and being guided by the 5, 10, and 20 fathom lines, the voyage will be rapidly made without much risk. We have already cautioned the mariner not to stand into less than 5 fath-

oms off the north shore, and, to the eastward of the Monte de Cuyo, not into less than 10 fathoms, to avoid the cape Catoche banks.

Should a vessel be overtaken by a Norther off the west side of the peninsula, the water is so smooth that she will find it advantageous to anchor in the depth most convenient to her draught, and await the change. It is necessary, however, to bear in mind that the ground is not good to the northward of lat. 21° N., and that it will be prudent to ease the anchor down.

Rio Champoton.—The coast, from Punta Seiba, trends south, 18 miles, to the Rio Champoton, which has 3 feet on the bar, with 9 to 12 inside; it is said to be navigable for large bongos 60 miles. Off its mouth, 400 yards distant, there is a small, rocky cay, 6 feet high, the channel into the river being south of it.

The village of Champoton is on the south side of the mouth of the river; it has two large churches, also an old fort.

The hills between Punta Seiba and Champoton are more broken, and farther back, than at Lerma; they terminate about 10 miles SE. ½ E. of Champoton, in a prominent peak, 360 feet in elevation.

Between Punta Seiba and Champoton there are several farms, near the shore, that of Siho-playa, 6 miles south of Punta Seiba, being visible from seaward.

The coast, from Rio Champoton, trends SW., 50 miles, to Puerto Escondido, the eastern entrance of the Laguna de Terminos; it is a continued sandy beach, all very low, without hills at the bank.

The objects on the beach are Kuhal, a red house 4½ miles from Champoton, Eschkakaltoe, white houses, at 15 miles; and Niche, huts, at 21 miles.

Las Palmas is a small savanna, with palm trees in it, 24 miles from Champoton; and the pass of Sabancuy is a low haul-over, 8 miles farther on.

Sabancuy village, situated on the east side of a lagoon, at the back of the haul-over, is not visible from the sea.

Champoton shoals are ridges of hard sand and shells, lying to the westward of Champoton, and extending north and south, 6 miles. The shallowest patch, of 13 feet, is W. ½ N., 10 miles, from the river, and there is one of 17 feet, 2 miles farther out; these shoals lie within the 5-fathom line.

The anchorage off Champoton should be approached from the northward, to avoid the shoals. Vessels should make Punta Seiba, and run along shore in a few feet more water than required, taking up a position with the village bearing E. ½ S.; leave this anchorage in the same manner. It is not recommended that vessels drawing over 12 feet water should pass southward of the Champoton shoals.

Sabancuy shoals are of the same character as those of Champoton; the shoalest, of 13 feet, lying NNW. ¾ W., 8 miles, and the outer, of 21 feet, NW. by N., 11 miles, from the haul-over, or pass, of Sabancuy. There are several others around, and they all lie without the 5-fathom line. The shoals on this coast cannot be perceived by the eye.

Between these groups, but not more than 5 miles off shore, are many ridges, with 9 to 16 feet on them.

Laguna de Terminos is about 50 miles in length, NE. and SW., and 30 miles in breadth. The shores are swampy, and the lagoon is shallow nearly all over; many rivers flow into it, and by these, the logwood, obtained in this district, is brought for shipment to the island of Carmen. There are mountains about 40 miles inland; these are sometimes seen prior to a Norther, or before heavy rains.

The Rio Palizada flows into the SW. corner of the lagoon; it is the most important of these rivers, being navigable for large canoes of 15 tons burden; it separates the provinces of Yucatan and Tabasco. About 33 miles from the mouth, on the left bank, is the town of Palizada, which in 1850 contained 3,500 inhabitants, and at 50 miles up it joins the Usumacinta, which is ascended by light canoes for a further distance of 150 miles, to Las Playas, whence a mule road, of about 35 miles in length, leads to Palenque.

Pureto Escondido is the eastern of the three entrances to the lagoon; it is very narrow, and difficult to observe from seaward; inside are many sand banks, and the bar has but 2 feet of water. A canal leads from it to the lagoon of Sabancuy.

From the Escondido entrance a sand and shell bank extends NNE. ½ E., 3¾ miles, the end of of which, with 9 feet on it, and 3½ fathoms close outside, is 2 miles off the beach.

Puerto Real island is 7 miles long and 1 mile broad, and the tops of the trees on it are from 40 to 50 feet high; its outer side is a sandy beach, trending SW. Close round Punta del Tigre, the west end, is the fishing village of La Aguada. Between this island and that of Carmen is the middle entrance to the Laguna de Terminos, 2 miles in width, through which, over the bar, small vessels drawing 9 feet water may reach secure anchorage off the village of La Aguada.

From the Punta del Tigre a spit extends WNW., 2¼ miles, on which, for the first mile, dry spots will be found, the tail having from 6 to 12 feet; this is of hard sand, and a good deal of it breaks with a strong sea breeze.

From the NE. point of Carmen island, a sandstone bar, with 6 to 11 feet on it, extends across, NE. by E., and joins the middle of the south side of the Punta del Tigre spit.

This entrance may be distinguished from seaward by observing that the land on either side continues in nearly the same straight line, whereas,

at the western entrance, point Xicalango projects considerably, and there is the Indian village, with the light tower, on that side, and the lookout tower on the west end of Carmen, to be seen; shallow water also extends further from the shore than at Puerto Real.

Directions for Laguna de Terminos, Puerto Real entrance.—Having closed the land to 3 miles, with a depth of 5 fathoms, and in a sailing vessel, taking the sea breeze, bring Rompida point and NE. point of Carmen in line, bearing SE. ¾ S., for the first part of the course. In this track, 13 feet will be carried, between Puerto Real spit, and some shell ridges to the westward, having 8 feet water, the channel being ½ mile wide; when the highest tree on Puerto Real island bears E. ¼ N., being then ½ mile from Carmen, haul up for it, carrying 23 to 16 feet, until Punta del Tigre bears ESE. ¼ E.

The narrow part of the bar, with 10 feet, must now be crossed, keeping the point on that bearing, and as soon as the lead indicates it is passed, alter course a little southward, to avoid the edge of the Punta del Tigre spit. In going out, these directions must be reversed, sailing vessels leaving with the land wind.

Tides.—The flood sets into the lagoon to the SE., over the bar, at 1 mile per hour, taking the course of the deep water channels when inside; the ebb sets out in a contrary direction, from 1 to 3 miles per hour, being accelerated by the outflow of the rivers. Vessels entering or leaving should always be prepared to anchor, if the tide will not permit them to keep the proper courses, and advantage should be taken of slack water when convenient. The time of high water is uncertain; the small rise and fall of 1½ feet depend greatly on the force and direction of the wind, and the state of the adjacent rivers.

Within this entrance are several sand and mud banks, which, no doubt, are continually changing their shape at the time of the floods; on these will be seen many alligators, which abound in all parts of the lagoon.

Supplies.—Good water may be obtained at the village of La Aguada. The inhabitants have a few cattle on the island, but cultivate no part of it. There is plenty of firewood on the east end of Carmen.

Outer anchorage.—Vessels can, of course, anchor outside the bar, with the ordinary land and sea breezes, in any convenient depth, but in the Norther season this would not be very safe, although the holding ground is good.

Carmen island is 20 miles in length, ENE. and WSW., but its breadth is uncertain; and it is so low that the tops of the trees, with which it is only scantily covered, are generally but 40 to 50 feet above the sea.

The north side is bounded by a white sandy beach, which distinguishes the island from the main; the shore to the westward, about Xicalango

point, is composed of dark mud, backed by dense woods, from 50 to 60 feet high, and of more regular height.

The west end of the island terminates at a distinct point, 2 miles to the northward of Sagatal point on the main. At the extremity is fort San Felipe, in which there is a lookout tower 45 feet high, the frame painted white, and on the summit is a flagstaff and yard. On the north shore, 1¾ miles to the eastward of the fort, is a small Indian village, of huts, called Palmar; and near it a somewhat remarkable clump of trees 50 feet high, and a grove of cypress trees.

At ¾ of a mile to the SE. of San Felipe fort is the town of Laguna de Terminos, which is the port of entry for the rivers emptying into the lagoon. Wharves extend from the town to the depth of 13 to 18 feet, and vessels load alongside them, to 13 feet, when they proceed to the outer anchorage for the remainder of their cargo.

From Sagatal point, the shore trends northwestward for 8 miles to Xicalango point, which forms the western point of entrance to the channel leading into the harbor. From Vigia point, at Villa de Laguna de Terminos, a sand spit extends NW. 4 miles; it breaks in several places, with the sea breeze, and 1½ miles from the point, at a ridge named Banco Seco, it dries a foot. The extremity of the spit, which lies 2½ miles from the main, is named Punta del Restinga, and may be considered as the east point of entrance to the channel.

From Punta del Restinga, an extensive flat of soft mud runs across to the main, and outwards 3½ miles, leaving a channel about 1¼ miles in width, carrying from 13 to 14 feet water close up to the Restinga spit. Inside this flat, the depth increases to 16 and 18 feet, and even 7 fathoms abreast the town. Outside the depths gradually deepen to 3 fathoms, at the distance of 5 miles, NNE. of the lookout tower.

About ¾ of a mile to the westward of the Banco Seco, a shallow spit, named Cascajal, which is steep-to, extends to the southward, and terminates wtih the lookout tower bearing E., and Sagatal point SSE., which contracts the channel to a breadth of about ¾ of a mile. To the eastward of this the harbor opens out into a secure basin, about 1½ miles in extent.

Supplies.—Spring water is readily obtained from a pump at the north end of the town, as long as the vessel is in port, by the payment of three dollars. Firewood is sold at a dollar a cord, but it may be cut at Sagatal point, close to the beach, free of expense, and in any quantity. Beef and vegetables are in abundance, and at moderate charges.

Light.—From Sagatal point the coast trends W. by N., 2½ miles, to a small Indian village, having in it a light-house, with the lower part *red*, and the upper part and lantern *white*, from which a *revolving white* light is shown, at an elevation of 100 feet above the sea, every *half minute*, visible in clear weather from a distance of 14 miles.

Anchorage.—Vessels drawing more than 13 feet will find good anchorage with the lookout tower about S. by E., in the depth most convenient; the holding ground is excellent, being mud, but not safe in Northers.

Directions for Laguna de Terminos, western entrance.—The land should be made a little to windward, as there is sometimes a westerly current of ½ knot an hour, and in order to be in readiness for the sea breeze, which sets in from the NE., at about noon. In the night, a vessel ought not to come into less than 10 fathoms. From a height of 14 feet, the land will be sighted at about 9 or 10 miles distance, in 7 fathoms water, and in standing on to the SW., the depth should not be decreased to less than 4 fathoms, until the lookout tower bears SW. ½ W., about 7 miles, and the Carmen shore is about 3 miles distant. The town is hidden by trees from the NE., but the masts of the vessels may be seen above them, and soon after, the lookout tower and light-house.

The land of Carmen makes in irregular clumps of trees, which appear like hillocks, but westward of the lagoon it is of uniform height, which is a good guide when coming from the northwest. Steering towards the entrance, do not bring the western extreme of the mainland to bear westward of WSW. ¼ W., to avoid the Restinga spit. The depths will gradually decrease to 14 feet, with the light-house at Indian village S., which line leads over the flat in mid-channel.

When Sagatal point bears SE. by S., steer for it, until the church bears E. ¼ S., which leads to the anchorage, abreast the town. Should the sea breeze be scant, when standing to the southward, do not bring the church, in the center of the town, to the northward of NE. ¾ E., to avoid the harbor shoal; and in reaching to the northward, inside the Cascajal spit, do not bring it to the southward of SE. by E. ¾ E. With a Norther, the flat breaks, but is passable for a vessel drawing 11 feet.

It will, however, with vessels drawing 13 feet, be better to take a pilot; for, although the western edges of the Restinga and Cascajal spits are stationary, and steep-to, there may be a foot more or less water on a different line. The water is so muddy that the edges of the banks do not show themselves, and the lead gives no warning. The depth on the west side gradually decreases to the main. The best time to leave is at daylight, when the land wind will generally carry a vessel to a safe offing.

Tides.—The time of highest tide is about noon. The rise seldom exceeds 1½ feet, but it is greatly influenced by the strength and continuance of the breezes, and the state of the rivers which flow into the lagoon. The flood sets in with the sea breeze, sometimes at the rate of 2 knots. The ebb runs out of the lagoon from 2 to 3 knots, and its greatest strength is at early dawn, and late in the evening; in the channel, abreast the Cascajal spit, the velocity is about 1½ knots.

The coast, from Xicalango point to San Pedro river, trends about W., 28 miles, thence WSW., for 13 miles, to Tabasco river, and is all along low, without any remarkable feature, but is distinguished from the land of Carmen by dense woods of more regular height. The heights of San Gabriel are from 40 to 60 miles inland, and consequently very seldom visible. A few miles to the eastward of the San Pedro is a look-out tower, on the east side of the entrance of a small stream, about 200 yards in width.

The soundings between Xicalango point and San Pedro river are irregular, especially near Xicalango point, and vessels are warned not to come into less than 10 fathoms, although the bottom is so soft as to give to this part the name of Lodazar (mud bank), and vessels touching on it do not receive much injury; whilst the bottom to the eastward of the point is hard, which is a good guide. Between San Pedro and Tabasco rivers the depths are more regular; there are 5 fathoms at 2 miles distant, and the bottom is blue mud.

The river San Pedro forms the coast boundary between Yucatan and Tabasco, and joins the Usumacinta at about 42 miles from its mouth. The entrance is from $\frac{1}{3}$ to $\frac{1}{2}$ mile wide, and is pointed out by a lookout tower and some huts, on the west side. The bar is passable for canoes and bongos of 3 or 4 feet draught.

Buey islands.—Off the west side of the entrance of the Tabasco is Buey island, on the north end of which is a flat clump of trees, higher than those in the neighborhood, which has the appearance of a bluff, and on the east end of the island is a lookout tower. At $\frac{3}{4}$ of a mile to the northward of Buey island, there is a shoal with 2 feet water.

The Tabasco is the principal river of the province of that name, being navigable for vessels of 8 feet draught to San Juan de Bautista, the capital, about 72 miles from the entrance, and for bongos and canoes to a considerable distance farther into the interior. The only practicable channel into the river is between Buey island, and a bank, with 6 feet water, $\frac{1}{2}$ mile westward of it. On the east point of the entrance of the Tabasco, which is composed of white sand, and projects to the westward, is a hut, and about a mile within it, on the right bank of the river, is a small fort of 12 guns, with a lookout tower inside it, which has a signal post on the summit. Close to the fort is the pilot establishment, which consists of a few huts and canoes, with accomodation for a single boat's crew.

About a mile above the fort is a thickly wooded island, about $1\frac{1}{2}$ miles long, and from its north end a spit of mud extends a mile. On the east side of it is the main channel, which is rather less than $\frac{1}{2}$ mile in width; on the west side there is a passage for canoes only.

The Frontera.—At a short distance higher up, on the right bank, is a straggling village, named the Frontera, which comes in sight from

off the entrance, on a SSE. ¼ E. bearing. This is the port of entry of the province, and the residence of the agents of the principal merchants and logwood cutters in the interior. Vessels bound up any of the branches are obliged to remain here until their papers have been examined at the capital.

Opposite Frontera is the small stream Arroyo de Trepichi, which is navigated by canoes, and communicates with the Chiltepec. About 1½ miles higher up, on the same side, is the Arroyo de Pula, which is only a shallow brook; and at 8 miles from the Frontera, the Tabasquillo enters from the SW., flowing from some lakes in the interior. This stream can be ascended by vessels a considerable distance, but its bed is so narrow, and its banks so densely wooded, and consequently so infested with mosquitoes, that they generally load at its entrance in the Tabasco. About 3 miles from the junction of the Tabasquillo is Los tres Brazos; here the Usumacinta enters from the SE., and the San Pedro el Chiquito branches off to the eastward, and after sweeping round southward for about 30 miles, runs into the Usumacinta 16 miles off.

The Usumacinta is supposed to take its rise in the mountains of Vera Paz, and drains the great logwood country. Its length exceeds that of the Tabasco, and its bed is wider and deeper, but the banks are not so thickly inhabited. It has sufficient depth for vessels as high up as the Palizda branch, and to that town, and canoes ascend about 150 miles from the sea.

Light.—From a light-house erected at the harbor of Frontera de Tabasco, a *fixed white* light, varied by a *flash every forty seconds*, is exhibited at an elevation of 77 feet above the sea, and should be visible in clear weather—the fixed light from a distance of 11 miles, and the flash from a distance of 13 miles.

Supplies are not always certain at Frontera, but canoes frequently bring from the interior, pigs, poultry, eggs, and vegetables; and river fish are abundant daily. Beef of an inferior quality may be obtained two or three times a week, but fruit is scarce.

Directions for Tabasco river.—From a wide offing, the entrance of the river is found by bringing the center peak of the San Gabriel mountains, when seen, to bear S. by E. ¾ E. The channel across the bar is so changeable that a pilot is always necessary, and if obliged to await one, anchorage may be taken up in 6 fathoms, with the hut on on the east point of entrance S. by E. ¼ E.

Should daylight fail before reaching the bar, it will be better not to run to leeward of San Pedro, as it will be difficult to get back to windward. Should it be calm during the night, which is generally the case, it will be more advantageous to anchor; but if there is a working breeze it will be better to stand off and on; in, to 6 fathoms, and off, into 12 fathoms.

In the season of Northers, from September to March, there is generally a depth of 11 feet water on the bar, and sometimes more, but it is very uncertain, for if a freshet takes place, and continues any length of time, it decreases considerably by the accumulation of the sandy deposit.

When the rivers are at their highest level, the bar is the shoalest; and when they are at their lowest point the channel, being contracted, is scoured out, and becomes deeper. At the close of the rainy season, in December, there are, at times, only 7 feet water, but the first Norther will increase the depth to 10½ feet, and again, a freshet may soon after reduce it to 7 or 8 feet. In the rainy season vessels have been detained inside the bar two months, waiting for sufficient water to cross it. The direction of the channel will also change with these fluctuations, and the discolored river water sometimes reaches a distance of 30 miles from the coast.

Tides.—The rise is about 2 feet; there is only one tide in 24 hours, and it is greatly influenced, both as to time and height, by the winds in the gulf.

Winds.—During the seasons of Northers, on this part of the coast, the sea breeze does not set in before 1 or 3 p. m.; it blows from NNE. to NE., until about 7 p. m., and then draws gradually round to SE., as the land wind.

River Chilapa.—About 27 miles from the Frontera, the Tabasco receives, from the right bank, the Chilapa. The Tabasco here takes a bend to the SW., and the entrance of the Chilapa being of the same breadth, the one may be mistaken for the other. The Chilapa is said to have not less than 3 fathoms water, the banks are clear, and the dangers are all seen. About ½ mile within the mouth, on the east side, is the entrance to the Laguna del Viento, which latter is so large, that, with the exception of an island or two, the land on the southeast side is not seen from the river. The Chilapa is here about ¼ of a mile in breadth, but above this it is reduced to a width of only about 50 yards.

About 1½ miles from the mouth of the Chilapa is the entrance to the Arroyo de Jaboncillo, which is navigable only a few miles, and in the rainy season communicates with the above lagoon. Its entrance may be mistaken for the Chilapa, but the former runs to the SE., whilst the latter takes a bend to the SW.

After passing the Jaboncillo, the east bank must be kept aboard, as about 1 mile up, two arroyos branch off to the SW., into which the current runs with great strength. Above these the river makes a curve to the SE., and receives no more tributaries until it reaches the Cojinicuil, about 45 miles higher up. The navigation to this point in a sailing vessel is extremely tedious. In going up the Chilapa, after the first 3 or 4 miles, the courses are of no service, and the topsails are only of use where the wind blows up the reaches, which are not of any length, and

form sharp bends. The greater part has to be warped up, and in some places the stream is so weak that a vessel may be towed up with two boats ahead.

About 9 miles below the Cojinicuil, on the left or south bank, is the first rancho met with, which comprises several families; the second rancho is within 3 miles of the former, and the third is about 45 miles from the mouth of the Chilapa. Very few supplies can, however, be obtained from them.

The Cojinicuil, although very narrow, has not, with the exception of one place, less than 15 feet water, up to the Tumbadero, or logwood depôt. The current in the dry season is seldom more than ½ knot, which enables a vessel to tow up; its strength, however, varies morning and evening, and there is a rise and fall of about three inches, probably the effect of the land and sea breezes acting upon the Chicati, which communicates with the Usumacinta higher up. The banks are so densely wooded, with lofty trees, that the branches have to be cut down to enable the vessel to pass; the sails are consequently of no assistance.

The Cojinicuil, for the first 6 miles, runs in an easterly direction, and at this point the Arroyo de Palencio branches off to the southward; the latter has only sufficient water for small canoes when the rivers are full.

El Pozo Grande, about 3 miles higher up, is a sharp bend, first to the SE. then to the NE.; there is less water here, but double the width, which permits a vessel to swing round, and this is not practicable in any other part, until near the Tumbadero.

At about 6 miles above the Pozo Grande, the Arroyo de Jaboncillo branches off, and, as already stated, enters the Chilapa again lower down, near the Viento lagoon. For about 1½ miles it is scarcely more than 20 yards wide, and has very little water in the dry season.

Tumbadero is about 3 miles higher up, and the river is here about 30 yards wide. This is the highest point to which the Chilapa is navigable for vessels able to enter the Tabasco, and is consequently the depôt for the logwood collected on the banks of the numerous streams higher up. There are, however, only a few people here, who act as guards; there is nothing to be obtained in the way of provisions.

The advantage of the spot is, that, being free of wood, it enjoys the benefit of the full sea breeze, and is therefore a more healthy place to load. Immediately above Tumbadero, the Chicati and Cojinicuil meet; the latter becomes the Arroyo de Maluco, which unites with the Tepititan, about 9 miles above that town, and SSE., 18 miles, from the Tumbadero, it enters the great logwood forest. Bongos, carrying 40 to 50 tons weight of logwood, traverse these streams far into the interior, but in the dry season they are obliged to lighten, or transfer their cargoes to canoes, at a bar about 3 miles above the Tumbadero. Thence to the

bar of Tabasco there is not a less depth than 15 feet, except immediately to the eastward of El Pozo Grande, in the Cojinicuil, where there are 10 feet over some logs. The Chicati branches off to the northward; at the fork of the river it is about 120 yards wide, and at a short distance from the Arroyo de Maluco the water is at least 15 feet deep. It is said to join the Usumacinta at the distance of about 18 miles.

River Tepititan.—From the confluence of the Cojinicuil, the course of the Chilapa is to the SW., for 8 miles, to Encrucijada, when it changes its name to Tepititan. This river has a far more cheerful aspect than either the Chilapa or Tabasco, below the capital. The banks are more thickly inhabited, and there are numerous large ranchos, well cultivated, and with extensive grazing grounds. It is about 200 yards in breadth, and has sufficient depth up to the town for any vessel that can cross Tabasco bar. Above this it is navigable for bongos and canoes, into the interior lakes. Its stream is much stronger than that of the Chilapa, but the voyage from the Cojinicuil to Tepititan may be made in a light canoe in 21 hours, the distance being about 43 miles.

The town of Tepititan occupies a space of about ½ mile, along the left bank, about 34 miles above Encrucijada, and in 1844 was estimated to contain from 1,000 to 1,200 inhabitants.

Escobas.—Resuming the navigation of the Tabasco, at the distance of about 8 miles above the junction of the Chilapa, is the rancho of Escobas which is a good resting place, especially in heavy rains, and affords fresh provisions. In ascending the river, in canoes, it is advisable to leave Frontera at 2 or 3 o'clock in the morning, so as to reach this place before dark. At about 8 miles above Escobas, the Chilapilla enters the Tabasco, from the right or east bank, and, as before mentioned, branches off from the Tepititan at the Encrucijada. At the entrance there is a small rancho, consisting of a single hut, or covered shed.

This stream, although narrow, and more rapid than the Chilapa, is navigable for small vessels to a place called Pial. Two arroyos branch off from it to the SW., communicating with lagoons, but they have no water in the dry season. Between the mouth of the Chilapilla and San Juan de Bautista, the Tabasco receives only a few arroyos, navigable for canoes in the rainy season. There are a few shoals off the banks, and the least water is said to be at Acachapa, at a large bend, called the Turno del Diablo, about 6 or 8 miles above the capital.

San Juan De Bautista, the capital of Tabasco, is situated on the left bank of that river, on the first rocky formation above the alluvial deposit, about 70 miles from Frontera, at the entrance of the river. It contains the custom-house for the whole province. As stated before, vessels of 8 feet draught can ascend thus far, and unload alongside the banks.

A little above the city, the Tabasco, or Grijalva, receives the name of Misculapa, which, taking its rise in the mountains of Chiapa, and

flowing around that city, is navigable for large bongos and canoes to the village of Zayula.

River Gonzalez.—About 30 miles above San Juan de Bautista, the Misculapa throws off a large branch from the left bank, called the Gonzalez. This stream is navigable for canoes and bongos, the greater part of the year, throughout its whole length, of about 90 miles, and it enters the sea at the bar of Chiltepec, and Las dos Bocas, to the westward of the Tabasco. A little more than a mile from the capital, the Ista-Comitan enters from the right bank, and 2 miles above it the united waters of the Teapa and Tocotalpa empty from the same side. All these streams have their sources in the Chiapa mountains, and are accessible to canoes and bongos to a great distance.

The coast, from the bar of Tabasco to the river Tupilco, trends about W. by S., 41 miles, and is low, and fringed with mangroves and palm trees. The shore is all along clear, with regular depths of 4 or 5 fathoms at a mile distant; as far as Chiltepec the bottom is blue mud; off that opening, and Las dos Bocas, it is mud and shells, and to the westward of this coarse olive-colored sand. From the river Tupilco, the coast trends WSW., for 26 miles, to the bar of Sta. Ana lagoon. This coast presents the same features as before, fringed with mangroves and dwarf palmettos, and is equally bold, but the bottom is coarse sand and gravel, with shells. From the bar of Sta. Ana, the coast trends WSW., 32 miles, to that of Coatzacoalcos. About 16 miles from the bar of Sta. Ana, the river Tonala empties. Not far from the shore is a remarkable high tree, resembling a tower, which, brought to bear S. by E. $\frac{1}{4}$ E., leads to the entrance.

Chiltepec and Dos Bocas.—About 22 miles from Tabasco is the bar of Chiltepec, which has 7 or 8 feet water; and 4 miles farther to the westward are those of Dos Bocas, which have a depth of only 4 feet. As stated before, these are the outlets of the Gonzalez river, a branch of the Misculapa.

The river Coatzacoalcos flows into the extreme southwest corner of the gulf of Mexico, at the narrowest part of the isthmus of Tehuantepec, which is 120 miles in width. The river in its course receives various tributaries, and there are several islands in it. For about 20 miles, to the town of Minatitlan, the depth ranges from 15 to 75 feet; above that there are many rapids and shoals. There are but two places where 20 feet water cannot be carried, one abreast the island of Guerrero, and the other above the mouth of the Uspanapa river, at which places the depth is 18 feet. The bed of the river is mud, except at the shoal water below the sugar rancho, and at the extremities of the islands of Diablo and Guerrero, where sand and gravel are found. The banks of the river are low throughout, except at Paso Nuevo, and during the freshets are, with this exception, entirely overflowed.

Within the east point of entrance there is a round hill or morro, and on the west point a light-tower, fort, and lookout tower, on low red sandy cliffs; low land fronts the base of these hills for ½ mile. From the entrance points, shoals extend ¾ of a mile, the bar lying between their extremities. The bar is from 350 to 400 yards in extent, east and west, and 200 yards wide; it is composed of stiff clay, with only a thin coating of sand, and does not shift. There is a depth of 14 feet over the bar, and, in heavy Northers, it breaks right across.

Light.—A *fixed white* light is exhibited from the old lookout tower, on the west side of the entrance of the river, about ½ mile from the beach. It should be seen in clear weather 12 miles.

Pilot.—A pilot resides near the entrance of the river, who can be obtained by making the usual signal.

Anchorage.—The best anchorage is abreast the town, in about 7 fathoms of water, or, if a Norther is expected, above the town, under the lee of the woods. The holding ground is excellent, and there is no danger of dragging, with an ordinary scope of chain. Vessels are generally uneasy at their anchorage, during a Norther, on account of the strong current, and the wind across it. To avoid this, let go another anchor under foot, or moor ship with anchors up and down stream. If close to the shore, a hawser made fast to a tree will answer the purpose of the second anchor.

Tides.—The mean rise and fall is about 1 foot, but the tides are greatly affected by the winds, and the current of the river; a Norther usually causes a very high tide, and a SW. wind the contrary. The winds also affect the *time* of high water.

Directions for the river Coatzacoalcos.—The land should be made from the NE., as the current sets along shore to the NW., and also to keep command of the place with the sea breeze. The entrance is readily distinguished by the light-tower, which being brought to bear S. ½ W., leads over the deepest part of the bar, into 3 fathoms of water. When within the bar, haul up to the eastward of south, and steer in midway between the two points that form the entrance of the river. After passing over the bar, when within the points, the wind will baffle and fall light, and as the stream runs out strong even in the dry season, it may be necessary to anchor and warp up to the anchorage.

In proceeding from the mouth of the river to Minatitlan, keep the western bank on board as far as the Rio Tierra Nueva, which empties from the west, 2½ miles above the town.

Then, to pass **The Rock** (which lies SE., ½ mile, from the southern entrance point of the Rio Tierra Nueva, and has 6 feet water over it), haul gradually toward the middle of the river, and when a little above the mouth of the Rio Tierra Nueva, a large tree will be seen ahead, on

the high ground; steer for this tree, keeping the most easterly green mound directly astern; this will keep a vessel clear of The Rock and in not less than 15 feet water. The Rock will be passed when abreast of the point, on the eastern shore, where the grass meets the trees.

To go through the Kansas channel, keep close to the western shore, till the passage between the two islands of Pajaritos is well open; then steer for the eastern shore, on a course about SSE.; keep that shore close on board until past the junction of the trees and grass, when the channel will be all clear. This channel has nowhere less than 24 feet of water.

From this point, the channel to be followed is marked on the chart, and it is especially recommended to keep the southern shore on board, from the mouth of the Rio Uspanapa to within a short distance of Minatitlan.

Barilla island. From the bar of Coatzacoalcos the coast trends westerly, 12 miles, to the bar of the Barilla river, forming the north side of the island of that name; this river is joined to the Coatzacoalcos by the Ostion lagoon, which bounds Barilla island on the south. On the bank of this lagoon is the village of Minapan.

The coast, from the bar of Barilla river, trends N. by W., about 5 miles, to San Juan point, off which is a small islet. From San Juan point it trends NW. by N., 19 miles, to Zapotitlan point. From this point the coast line runs westerly, 3 miles, to the small river Carrisal, and 7 miles beyond it, in the same direction, is the entrance to Santa Camapa lagoon.

Santa Camapa lagoon.—The entrance to this lagoon may be known by a remarkable, large, umbrella-shaped tree on a bluff a little westward of it, and near to it a lookout hut; and to the eastward of the entrance is a high sand hill. In the rainy season the bar is said to have 6 feet water. In general it breaks heavily, and in crossing it, the rocks on the west side must be kept close aboard, giving the sandy point which forms the east side a wide berth.

Water.—Just within the bar, on the western shore, a small stream of most excellent water runs down over the rocks, so conveniently situated that boats may lie within 20 yards of it.

Anchorage.—With the umbrella tree W. ½ N., Morrillos point NW., and the eastern extreme of the land E. by S., there is anchorage in 6 or 7 fathoms, from whence the entrance of the lagoon will bear SW. ½ S. A heavy, uneasy swell, however, rolls into the bight; and it is not safe until after the season of Northers.

Morrillos point.—From the entrance to Santa Camapa lagoon the coast trends WNW. and NW., for 8 miles, to Morrillos point. This point is a bold, rounded bluff, and at a short distance SSE. of it is a look-out tower; westward of it is a small river, at the mouth of which is the village of Montepio.

The Coast.—About 7 miles NW. by W. of the Morrillos bluffs, is Roca Partida, a remarkable projection, composed of perpendicular cliffs, close off which is a rocky islet. From Roca Partida, to the entrance of Alvarado, the coast trends westerly, 32 miles. About 18 miles westward of Roca Partida is the lookout tower of Tuxtlá; and 8 miles farther on is that of Barrancas. The whole shore is quite clear, and there are 30 to 40 fathoms, 4 or 5 miles distant, whence the depths gradually decrease inwards, over a soft muddy bottom.

The coast from Alvarado trends NW. ½ W., 12 miles, and then about N. by W. 2 miles, to Salado Chico, and then NNW. 7 miles to Collot point, which may be termed the southeast extreme of the bay of Anton Lizardo. The sand hills terminate at a low, rocky point, about 5 miles westward of Alvarado. The land in the vicinity of Collot point is of moderate elevation, and visible from the anchorage at Sacrificios, about 10 miles distant. A mile westward of it is the small village of Anton Lizardo. The whole of the above space is clear, but in the season of Northers, extremely dangerous to vessels of heavy draught, as it offers no shelter whatever.

Water.—On the west side of Roca Partida is a small cove, and landing place in moderate weather, near which is a rivulet of excellent water.

Volcano of Tuxtlá.—The shore, between La Barrilla and Roca Partida, forms the base of the sierras of San Martin, the highest summit of which is the volcano of Tuxtlá. This peak rises 15 miles, S. by E., from Roca Partida, and SW. by W. ½ W., about 12 miles from Zapotitlan point, and is distinctly seen from Vera Cruz, 75 miles distant. When in an active state, the flames by night, and the column of smoke by day, afford excellent land-marks.

Alvarado is an extensive lagoon which runs along close at the back of the shore, for a distance of about 35 miles, having a bar at the entrance, with generally from 9 to 10 feet water on it. The town is situated on the western shore, 1½ miles within the entrance, and is a place of considerable commerce. Vessels can lie close off it. This lagoon receives numerous small streams.

The entrance is so narrow that it is not easily recognized, until on a bearing between S. by W. and S. by E., when the masts of the vessels off the town may be seen. The coast is composed of sand hills, varying from 50 to 200 feet in height, scantily covered with wood; and the east point of the entrance is pointed out by a remarkable sand bluff, considerable higher than any other in the vicinity, about 1 mile to the eastward of the bar. The discolored river water runs out to a long distance. In the rainy season, the current runs out so strong over the bar, that it requires a good breeze, and full sail, to stem it.

Pilots.—To cross the bar, a vessel will require the assistance of a pilot, who will be at hand on seeing the usual signal.

Anchorage may be taken up in 10 or 12 fathoms, about 2½ miles outside the bar; but it is not safe in the winter season.

Anton Lizardo.—From Collot point the shore curves to the westward, and around to the northward, to Mocambo point, forming a sandy bay, about 8 miles in width, in a NW. by W. direction, and 2½ miles deep.

Reefs.—From Collot point, a cluster of dangerous, detached reefs stretches off to the NE., 11¼ miles, and is about 8 miles in width; it breaks in fresh breezes, and protects an anchorage between it and the main, safe even in Northers, and more sheltered than that at Sacrificios. The outermost of the above reefs, called Anegada de Afuera and Anegadilla, occupy a space of 5 miles, E. by S. and W. by N., and about ½ mile in breadth. The northwest end of the Anegada de Afuera lies E. by S., 15 miles, from the light house at Vera Cruz, and ESE. ½ E., 10½ miles, from the Anegada de Adentro or Inner shoal. They dry at low water, and are steep-to, with depths of from 26 to 28 fathoms close outside them.

Beacon.—A beacon on piles stands on the NW. end of the Anegada de Afuera reef.

About 3 miles southward of Anegada de Afuera, is the Cabeza reef, 3½ miles long, NW. and SE., and from ½ to 1¼ miles in breath; the southeast end of which lies E., 8 miles, from Collot point. The channels eastward and westward of it carry from 16 to 24 fathoms, on sand and grass.

About 3½ miles westward of the Cabeza are the Rizo and Medio reefs, which are 1¼ miles apart. A mile farther, in the same direction, is the Chopas, and ¼ mile beyond it, the South Blanquilla reef, where there is sometimes a pole on the small sand bank which occasionally forms on it.

The South Blanquilla is the westernmost reef, lying NNW., 1½ miles, from the village of Anton Lizardo. The Medio and Chopas have each a small islet at its southeast extremity; the one on the Chopas is named Salmedina, and is covered with tall reeds, which are greener and higher than those on cay Verde.

Anchorage.—There are deep-water channels between the reefs of this last group, but they are too contracted to navigate, except between the south sides of the reefs and the main, which space forms the anchorage, in 7 to 11 fathoms, on sand, mud, and clay, with Blanquilla WNW. ¼ W., and the village from S. by W. ½ W., to SW. ½ W.; and the nearer the Chopas reef the better the holding ground.

Directions for Anton Lizardo.—From the circumstance of the wind on this part of the coast never blowing more than a fresh breeze, from any other quarter than NW. and N., the anchorage, although exposed to the full force of the wind, is so protected by the reefs, which dry at low water, and break heavily in Northers, as to be as secure as most harbors. In coming from the southward, however, very great care must be taken in approaching the outer shoals, which lie near the 30-fathom line.

In approaching the land, in the winter season, there is frequently a haze, which hides it until close to the shoal; it is, therefore, much safer to make the land to the northward, where it is clear and bold, and run into the anchorage by the western channel. With cay Verde, off Vera Cruz, bearing NNW. ¼ W., a SSE. ¼ E. course will lead up to Blanquilla bank, which is readily seen. As it is approached the house and lime-kiln at Anton Lizardo will become visible, when bring them to bear SE. ¾ S., and steer for them. When Salmedina cay bears E. ¼ N., steer for it, taking care not to bring the cay to the eastward of the above bearing, until the village of Anton Lizardo bears S. ¼ E., to avoid the ledge extending to the SE. from South Blanquilla; and observe that the shoals on the south side of the channel, abreast South Blanquilla, extend from the shore ¾ of a mile, and are so steep that the depth decreases suddenly from 16, to 8, and 2 fathoms water. The western edge of South Blanquilla is pointed out by the light green water over the white sand, and it can be rounded at the distance of 400 yards.

Medellin river, situated about 2½ miles southward of Mocambo point, has 3 feet on the bar, at low water, the channel over which is generally near the southern shore, and is easily recognized; it is, however, very dangerous, with the wind blowing strong into the river. At the entrance of the river there is a village, named Boca del Rio, having in it a large sugar factory. The town of Medellin lies about 5 or 6 miles inland, near the head of the river. There are depths of 6 to 3 feet all along the left bank; the water is fresh just within the bar, and fish are plentiful in Medellin river.

Vera Cruz.—Mocambo point is low, sandy, and rounding, but a little within it, is a saddle-shaped hill of moderate height. A fort formerly existed on this point, commanding the anchorage of Sacrificios. Thence the coast, which is low and composed of sand hills from 25 to 30 feet high, trends, with two slight indentations, NW., about 8 miles, to Gorda point. The locality is often pointed out from a wide offing by the mountain peaks of Orizaba, and Cofre de Perote. The former bears W. ¾ S., 65 miles distant from the castle, and its snow-capped peak, which is 17,895 feet above the sea, is visible, under favorable circumstances, from a distance of 150 miles. The Perote lies on a WNW. ½ W. bearing, 60 miles from the same spot, and reaches an elevation of 13,995 feet. To the southward the volcano of Tuxtlá is also a good guide. When the weather is not clear enough to see these peaks, point Mocambo, the Castle San Juan de Ulloa, and cay Sacrificios are very good substitutes to use in marking the position of a vessel in regard to the reefs.

Midway on the shore between Mocambo and Gorda points, is the city of Vera Cruz, which occupies a space of ¾ of a mile, and is the capital of the province, and the chief commercial port in this part of the gulf of Mexico. The city of Vera Cruz is capable of receiving within

its walls 20,000 inhabitants. It is strongly fortified, and, besides the protection afforded by its walls, is defended by the castle of San Juan de Ulloa, placed on a small rocky island at the south extreme of the Gallega flat, ½ mile from the shore, abreast the north end of the city. The channel between the south end of the flat and the shallow ledge which skirts the main, is termed the harbor, and is about ¾ of a mile in extent, NW. and SE., and from 400 to 600 yards in breadth, with depths from 3 to 5 fathoms, on oozy bottom. Coral formation is said to be gradually diminishing the depth of water in the harbor. The flat is so steep that vessels of war, not drawing more than 18½ feet water, moor alongside the castle to rings placed in the walls for that purpose. Other vessels anchor and moor in tiers, close up under the flat, or proceed to the anchorage off Sacrificios; the former position is not considered safe in Northers.

Supplies.—Fresh provisions are easily obtained, the market being well stocked.

Water, of fair quality, is brought to the city from the Jamapa river, in pipes, but requires filtering.

Coal can be obtained here, at a cost of from $14 to $17 per ton, delivered on board, but is of inferior quality, on account of deterioration from exposure, and mixture with sand, which is allowed to blow over it.

Weather signals.—*A blue flag* indicates that a Norther is blowing at Tampico; *a red flag with black ball*, shows that communication with the shore is dangerous.

Lights.—On the west angle of the castle of San Juan de Ulloa is a white tower, 60 feet high, from which is exhibited a *revolving white* light, attaining its greatest brilliancy every forty-five seconds, 80 feet above the sea, and visible from a distance of 15 miles in clear weather.

From the old convent of San Francisco, in the city of Vera Cruz, a *fixed and flashing white* light is exhibited, the flashes being shown *every minute*, elevated 102 feet above the level of high water, and in clear weather should be seen from a distance of 15 miles. The tower is painted blue, with white stripes at the upper part, and is about ½ mile, SW. ¾ S., from the old light in the castle of San Juan de Ulloa.

Anegada de Adentro reef.—The front of the shore, for the space of 5 miles, is skirted by detached reefs, which stretch off to a point 5 miles to the eastward of the city, leaving channels between, navigable for the largest vessels. They are generally termed the Inner shoals, those off Anton Lizardo being called the Outer shoals of Vera Cruz. They all break in moderate breezes, but if there be light winds and no sea, and the tide has covered the rocks, the edges, having only about 3 feet water, are easily seen from aloft, and are so steep that they may be passed by the eye within 200 yards or less.

Anegada de Adentro, the outermost reef of the Inner shoals, is 1¼ miles long, NW. and SE., and about 600 yards in breadth. Its southeast end lies E. ¾ N., 4¾ miles, from San Juan de Ulloa light-house; there are 15 to 22 fathoms within 200 yards of it.

Isla Verde reef, which lies SW., 1 mile, from the Anegada de Adentro, is ¾ of a mile is extent, NW. and SE., and about ½ mile broad, and at the southeast end is a small cay, which has the appearance of a white cliff. The channel between the above reefs carries 16 to 20 fathoms, over sand and shells.

A mile farther to the SW. is the Pájaros reef, a mile long, NW. and SE., and about 600 yards in breadth, and between it and Isla Verde the depths are 12 to 16 fathoms, over oozy bottom.

Sacrificios reef, which is only 600 yards to the southward of Pájaros, and about ¾ of a mile from Mocambo point, is ½ mile in extent, NW. and SE.; and on the south end of it is a sandy islet, about 300 yards in circumference, which has upon it four tall palm trees, visible for 7 or 8 miles. The channel between it and Pájaros is scarcely 400 yards wide, but carries from 5 to 10 fathoms. The channel to the westward of the islet, or between it and the main, is 800 yards wide, with 5 to 10 fathoms in midchannel.

Mersey shoal is a small detached bank, with 2¾ fathoms on it, lying 400 yards, NW., of the Sacrificios reef.

Anchorages.—There is anchorage, with excellent holding ground, under the lee of all these reefs, but the most protected is that off the west side of Sacrificios, which is considered safe for a few vessels even in Northers. The east sides of the reefs are easily rounded by the eye, and the closer a vessel anchors to them the better, only leaving room to swing to the land wind, should she not moor. Vessels not plying to Vera Cruz, and which have not permanent berths assigned them, must obtain permission from the captain of the port to anchor behind the castle. It is advisable for all men-of-war, and strange vessels, to anchor at Sacrificios first, and afterwards, if desired, move up to a selected berth off the city.

Blanquilla reef.—At 1½ miles westward of the Anegada de Adentro, is the Blanquilla reef, which is about ½ mile in diameter, and upon the south end of it is a small sandy cay with a beacon. The channel eastward of it has 17 to 20 fathoms, sand and mud.

Gallega reef.—About ¾ of a mile westward of Blanquilla reef is the east extreme of Gallega reef, and the channel between carries 10 to 16 fathoms water. The Gallega reef extends in a southerly direction, 2 miles, and is about ¾ of a mile in breadth near the southern end. It is separated, however, by narrow cuts, into three parts, the northern portion being called Galleguilla, and the north end of it Gallega point, which bears N. by E. ½ E., 1¾ miles, from the light-house, and ESE. ¾ E.,

about 3¼ miles, from Gorda point. At 300 yards north of this point is a rocky shoal, with 4 fathoms of water over it: and 300 yards from the northwest extremity of the middle part of the reef, is another rocky shoal, with 4½ fathoms of water over it. The channel between Gallega and Galleguilla is about 150 yards wide, with a depth of 8 fathoms. The western extreme of the southern part of the Gallega reef is named Soldado point.

Shoals.—About 400 yards NW. of the light of San Juan de Ulloa, is a detached shoal, of 13½ feet water, named Laxa de Afuera; and a short distance southward of Laxa de Afuera, lies another small head, with 13 feet water, named Laxa de Adentro. These shoals are said to be marked by buoys, but they cannot be relied upon as being in place, owing to the action of the sea.

A narrow tongue of Gallega reef, covered by 17 feet of water, runs out in a southeasterly direction, about 67 yards, from the main line of the reef, with an average width of about 25 yards, to a point lying SE. by E. ¼ E., 880 yards from the lighthouse on San Juan de Ulloa. From this point the reef trends NW. and NE., to a point lying 1,000 yards ESE. ½ E. from the light-house, forming an irregular bight.

El Burro is a shoal covered by 17 feet of water, which may be said to constitute the SE. extremity of Gallega reef, and ought to be so considered by vessels entering the harbor of Vera Cruz from the southward and eastward; inasmuch as a vessel which could not pass over the shoal itself with perfect safety ought not attempt to pass north of it. Commander Sicard, U. S. Navy, calls it a shelf projecting from the southern edge of Gallega reef, and locates its center 987 yards, SE. by E. ⅛ E., from the light on San Juan de Ulloa, and 107 yards from the extremity of the narrow tongue above referred to. This shoal, considered separately, forms an irregular ellipse, extending 60 yards, NW. by W. and SE. by E., its greatest width being 43 yards, at a point ⅓ its length from the NW. extremity.

The SE. extremity of El Burro is therefore 1,017 yards, SE. by E. ⅛ E., from the light-house, leaving a channel with from 3 to 5 fathoms, 667 yards wide, between it and the NW. point of Lavandera shoal, the deepest water being found near the latter point. At a distance of 100 yards, N. by W. ¾ W., from the center of El Burro lies another shoal patch, of 16 feet; this is nearly round and has a diameter of about 20 yards.

Lavandera, situated ¾ of a mile, SE. ½ E., from the light-house, and ENE. ¾ E., nearly the same distance, from Santiago fort, at the southeast angle of the city walls, is a small shoal with 3 feet water, on which the sea breaks only in heavy breezes.

About 400 yards southward of Lavandera is the Hornos reef, and between them is a channel for coasters.

Between the Lavandera and El Burro reef, the east channel leading into the harbor is about 650 yards wide, with depths of 3 to 5 fathoms.

Directions for Vera Cruz.—Vessels bound to Vera Cruz from the eastward, after leaving the Campeche bank, by either of the passages, should endeavor by all means to approach the land on the parallel of 19° 30′ N., that of the Cofre de Perote, to avoid the outer reefs.

In the winter season, due allowance must be made for a southerly current, which increases its strength previous to, and after, Northers; and in the summer for a northerly set, caused by the swollen southern rivers. Some authorities, however, state that previous to the Norther the current sets to the northward; no opportunity should, therefore, be lost of checking the latitude.

In the season of Northers, the light at San Juan de Ulloa ought not to be sighted, without the certainty of procuring a sheltered anchorage before night, for these winds are so treacherous, and become so suddenly violent, as to leave no time for obtaining a safe offing.

To attempt to run into the harbor in a Norther is extremely perilous, for it blows more powerfully within, than without the shoals. No confidence can be placed in anchors, and no assistance can be given from the shore in case of accident. In these winds the entrance between points Caleta and Soldado breaks right across.

Should a vessel be caught off the port in a Norther, short tacks should be made, under as much sail as can be carried, so as to be in a position to run in, the moment the wind abates, in order to escape another. Great care must be taken not to drift to leeward of the port.

Pilots may be obtained, but they are of little service, except to guide to a clear berth; they will come outside the reefs in moderate weather, if a signal is made. The harbor is not suitable for vessels drawing over 18 feet water. Those above that draught should therefore proceed to Sacrificios.

Northwest channel.—Having sighted land on the parallel of 19° 30′ N., it should be skirted at the distance of 8 or 10 miles, taking care not to come into less than 8 or 10 fathoms off Brava and Gorda points. The castle being in sight, when at the distance of 3 or 4 miles, bring the larger of the two domed steeples, with a cross on the top, which is also the westernmost in the city, to bear S. It will then appear with two steeples on the west side of it, one a spire, the easternmost flat-topped. At the same time will also be seen, behind the latter, a small hill, which is composed of bare sand at the northwest end, but covered with grass at the opposite extreme.

Steering in S., upon the above line, will lead close along the west side of the Gallega reef, in regular depths, decreasing from 10 to 4 fathoms on the bar between Caleta and Soldado points. When the southwest side of the square building that the look-out house stands on, in the castle, is in line with the northeast side of the light-house, bearing SE. by E. ¼ E., or when Sacrificios island is just open of the castle, SE. ½ E.,

steer for the latter, taking care not to open the light-house to the NE. of the look-out house, until close to the castle; when steer round to the southward, and anchor close off the south side, in 5½ to 4½ fathoms. As the holding ground is not good, in the season of Northers, it will be better to moor with the port anchor to the NW., and the starboard anchor to the NE., with a stream astern to prevent swinging to the land-wind. At other periods moor with the port anchor to the NW., and the starboard anchor to the SE. The rings in the walls of the castle were formerly used by men of war, for one cable, but they are now decayed, and are not trustworthy.

Southeast channels.—In the event of being to leeward, a vessel may be navigated through the southeast channels without much difficulty, except that between Pajaros and Sacrificios, which, being only 400 yards wide, is not safe for a stranger. However, having to run through this opening, in case of necessity, keep Gorda point a little open to the northward of the northeast angle of the fortification under the castle of San Juan de Ulloa, bearing about NW. ½ W., which mark carries also to the north eastward of the Lavandera. When an isolated stone building on the main, which serves as a slaughter-house, is in line with the outer angle of the city walls, on which stands a large barrack, the Lavandera will have been passed, and a course may be shaped for the harbor.

Blanquilla channel.—Should the wind be scant, and to the eastward of NE.—which is very probable if late in the day—it will be better for a heavy sailing vessel to enter by the channel between the Galleguilla and Blanquilla. This is safely accomplished by running in with the light-house SW., which will lead up to the northwest extreme of the Blanquilla. The edge of this bank will be seen from aloft, and being abreast it, haul up to the southward, rounding the Gallega reef at the distance of about 400 yards, and anchor as before.

Winds.—Land and sea breezes regularly alternate, even in the intervals between Northers, which alone overpower them. The former comes off soon after sunset, and the latter sets in about 9 a. m.

Tides.—Both at Vera Cruz and Anton Lizardo there is but one tide in the 24 hours; and the time of high water is greatly influenced by the force of the wind. In the summer it generally happens in the morning, and low water in the evening; and in the winter just the reverse. The usual rise is from 2 to 4 feet, but it has been known to reach 6 feet. In strong breezes the level of the sea will sometimes remain stationary for three or four days. The tidal stream appears to be overcome by the current, which also varies in force and direction with the prevailing winds.

The coast, from Gorda point, trends about NW. by W. ¼ W., a distance of 7 miles, to the river Antigua, whence it runs NNW., 7½ miles,

to the point and river San Carlos, thus forming Antigua bay. Midway between the two rivers, a shoal, about 1½ miles in length, extends to the distance of ½ mile. From San Carlos river, the shore trends NNE., with a slight curve, for 3 miles, to Zempoala point. About 1½ miles inland, and nearly on the parallel of the point, is the lookout tower of Zempoala

Juan Angel reef.—From a mile southward of Zempoala point, a reef stretches to the northward, 3 miles, and extends about a mile from the land. There are two shoal patches, within ⅓ of a mile of each other, a little northward of the Juan Angle reef, and on the meridian of Zempoala point. The entrance to the Juan Angel river bears from the northernmost patch about SW. by W. ¾ W., 1 mile.

Zempoala shoal, surveyed by the U. S. S. *Fortune* in 1874, is about 800 yards long, in a NE. by N., and SW. by S. direction, and 400 yards wide, is composed of sand mixed with broken shells and coral, except on western edge, where it is rocky and foul. The shoal lies nearly 4 miles to the northward of point Zempoala, and aboat 2 miles from the nearest shore, with a depth of from 2¾ to 5 fathoms on it, and from 12 to 15 fathoms all around. From the center of Zempoala shoal, Zempoala point bears S. ½ E., Zempoala peak W. ¾ N., and Bernal Grande NW. by N.

The rocky ridge, with only 4 fathoms on it, between Zempoala shoal and the shore, mentioned by some authorities, could not be found; nor could any other shoals be found in the locality. There is a channel 1 mile wide, having a depth of 12 fathoms, between Zempoala shoal and Juan Angel reef.

Coast.—From Zempoala point, the shore curves to the northwestward, to Point Peñon, 8 miles distant, and close off which, extending about a mile, are some reefs, and thence the coast trends NNW., 5 miles, to Bernal point. About midway between Zempoala and Bernal points, and 4 miles inland, is Zempoala peak, 2,300 feet high. To the southeast of Bernal point, at a distance of about ½ mile, is Bernal Chico islet, which, as well as the coast, is clear, and the channel between carries 5 to 5¼ fathoms, without risk.

Anchorage will be found off the south side of Bernal Chico islet, sheltered from the westward, as far round as N. There are 4½ fathoms at ½ mile from the beach.

Coast.—The shore, from Bernal point, trends N. by W., for 3½ miles, to Mariandrea point, which is somewhat more prominent, and formed by hills, which, about 2¾ miles inland, are 2,100 feet above the sea, and gradually slope to a low point. From thence the shore takes a NNW. direction, 8 miles, to Delgada point, which is NNW. ¼ W., 43 miles, from Vera Cruz light-house. From Delgada point, the shore trends NW. by N., 10 miles, to Piedras point, which takes its name from the rocks that

surround it, whence it continues on the same line of direction for 72 miles to the river Tuspan.

Mountains.—Commencing abreast point Delgada, and extending to the northwest, almost parallel with the coast, and from 4 to 10 miles from it, is a chain of mountains, the loftiest peaks of which, Los dos Atriscos, 2,400 and 2,500 feet high, are at the southern extremity. Los dos Hermanos, situated near the middle of the range, are 1,046 feet high. Mount Gorda is farther to the northward.

From the Rio Santa Anna, which is 4 miles NW. of point Delgada, to the Rio Caxones, a distance of 60 miles, there extends a low, sandy peninsula, from 1 to 3 miles wide, which separates a narrow lagoon from the sea, and which is pierced by numerous outlets, none of which will admit vessels of more than 7 feet draught.

The Rio Palmas is 21 miles, northwestward, from the Rio Santa Anna; it is closed by a bar, having over it about 6 feet of water. The mouth of the river will be recognized by several whitewashed huts forming the village of Palmas. When abreast Palmas the peaks of Los dos Hermanos are in line, which is a good mark for the port. An anchorage may be taken up off the mouth of the river, in about 9 fathoms, with the village bearing WSW. It is a place of no commercial importance, the only exports being small quantities of sarsaparilla and dye-woods.

The river Nautla is entered 6 miles, northwestward, from the Rio Palmas, and has two islets at its mouth; the bar, over which there are depths of from 3½ to 4½ feet, breaks right across, and the channel is so narrow that it is difficult, and often dangerous, for boats to cross. The position of Nautla is indicated by Los dos Hermanos, and further in the interior is seen the mountains of Maya, having a table top. There is also visible at some distance, among the trees, the roof of a shed situated 200 yards south of the river entrance.

Anchorage.—By bringing the least elevated summit of Los dos Hermanos (which is the most northerly one) in line with the northern extremity of Maya mountain, about SW., anchorage can be had in 9 or 10 fathoms of water, 2 miles from the shore. The bar of the river will then bear about SW. ¼ W. The village, which cannot be seen from the sea, is situated 1½ miles foom the bar, on the banks of a stream which empties into the river. The small French colony of Icaltipec is located on the river, a few miles from the village of Nautla, the inhabitants being engaged in the cultivation of vanilla. Nautla is the port from which are shipped the products of the town of Misantla, which consist of sarsaparilla, vanilla, pimento, and dye-wood.

Supplies.—Water and wood can be procured by employing the boats which transport merchandise across the bar, and, if the state of the bar permits, a vessel can water with her own boats, from a well near the shed

south of the river mouth. Poultry, eggs, and vegetables can be procured at Icaltipec, but it will be necessary to leave an order some days in advance. Excellent fish can be obtained.

The river San Pablo, midway between the river Nautla and Piedras point, serves as an outlet to the commerce of the large Indian village of Papantlo, situated 20 miles from the coast. The articles of export are the same as those at Nautla. On the left bank of this river, near its mouth, is the unimportant village of Tecolutta. Salt for the mines in the interior is received here from Campeche. There is generally a depth of from 6½ to 7½ feet of water on the bar, and vessels are loaded outside, by means of large launches. Supplies of wood, water, and provisions can also be obtained, by making use of these boats, the provisions consisting of fresh beef, pork, and fish. The entrance to the river will be recognized by a large palm tree, rising far above the huts on the river bank. A vessel will not open the mouth of the river until a little to the northward of it. Mount Gorda, with a conical summit, 9 miles to the southward of the river, is a good mark of recognition.

Anchorage.—The anchorage off the San Pablo entrance is in 8½ fathoms water, with the large palm tree bearing WSW., distant 1½ miles. A vessel should not anchor south of this line, or closer to the shore than the above distance, because the southern entrance point of the river is prolonged by a sand-bank, which would prevent her getting to sea readily, on the approach of a Norther.

Coast.—The coast, from the river San Pablo, trends NW., 14 miles, to the entrance of the river Caxones, and in this interval are the Baca de Lima and the Baca de Tejones, two small outlets of the lagoon.

The river Caxones will only admit boats and lighters, as there is a depth of but from 2 to 5 feet on the bar. The village of Caxones, situated on the left bank of the river, is composed of a number of huts, and to the westward of them are some large sheds for sheltering dye-woods. In coming from the north, a well-defined bay will be seen, at the bottom of which are several white rocks, or cliffs, resembling boats under sail. The bar is 100 yards north of these rocks. About 400 yards inside the entrance is a small wooded islet.

Anchorage.—The anchorage off the mouth of the Caxones is in about 7 fathoms, fine sand, 2 miles from the river mouth, and SE. of a prominent round point, called Caxones point, which, when seen from the northward, has a deep cut through it. Water and wood can be procured here by employing the services of the boats used for transporting cargo across the bar, but no other supplies are obtainable.

The exports are dye-woods and cedar.

Aspect of coast.—All this part of the coast, from Gorda point, is of moderate height, thickly covered with brushwood and small trees, and at almost all places bounded by a sandy beach. With the exception

of the reefs named, the shore is everywhere clear and bold; there are from 4½ to 6½ fathoms at 1 to 2 miles distant, and soundings extend from 25 to 30 miles.

Blake shoal, with 29 feet water, and 5 to 20 fathoms close around, lies in lat. 20° 44′ 50″ N., long. 96° 58′ 30″ W., about 13 miles from the mouth of the river Caxones. The bottom is hard coral. This shoal was discovered by the United States Coast Survey steamer *Blake* in 1877.

Reported shoal.—In 1878, the schooner *J. S. Lamphrey* was reported to have passed over a shoal, apparently a coral reef, ½ mile in extent, NE. and SW., upon which a depth of 4½ fathoms was found. The position given is lat. 20° 54′ N., long. 96° 54′ W., and it is thought this shoal may be indentical with Blake shoal, described above.

The river Tuspan is capable of admitting vessels drawing 5 to 6 feet water, up to the town, which is situated on the north bank, about 8 miles above the bar. The river, within the bar, deepens considerably, and is about ⅓ of a mile wide; it communicates with the Tamiagua and Tampico lagoons, canoes being able to pass. The mouth of the river is readily distinguished, on a tolerably clear day, by two or three houses on the north bank, a semaphore station being close by, and one house on the south bank. The general color of these houses is red. The opening of the river cannot well be seen from deck at a distance of 4 miles, but from aloft it can be distinguished from a somewhat greater distance. In running for the anchorage at the mouth of the river, the Tuspan reef should be given a berth of at least 3 miles; it is not visible from deck more than 4 miles, being scarcely above the surface.

Bar.—The bar at the mouth of the Tuspan is bad, and should not be attempted except in a very smooth sea, or with the services of a pilot. One will come off to the ship if the ensign is hoisted to the fore, this being the general signal for a pilot along this coast. The channel runs along the south beach, but there are no well-defined marks on the shore leading to it. There is a depth of but 6 feet of water on the bar.

Anchorage.—The anchorage off Tuspan bar is in about 7½ fathoms, mud, with the pilot station bearing SW. by W. ½ W. Masters of vessels will be often importuned, by the men in charge of the lighters, to anchor to the southward of this line, in order that they (the lightermen) may derive more benefit from the land and sea breezes; but it is not advisable to do so, because the holding ground further south is not so good, and the depth of water is less; and, in addition, the position would not be so good, in case a vessel should have to leave hurriedly, The lighters leave Tuspan about 2 a. m., and return toward the bar about noon, with the sea breeze. Inside the bar the merchandise is transferred to larger vessels, or landed at the custom-house.

Telegraph.—There is an electric telegraph from the mouth of the river to the city.

The coast, from the river Tuspan to the bar of Tanguijo, trends N. by W. ½ W., 7 miles; the shore presents the same features as before; but between are several banks and islets, at a distance from the coast, forming breakwaters to anchorages sheltered from Northers.

Tuspan reef, the southernmost of the banks off the coast between the river Tuspan and the bar of Tanguijo, lies NE. by E., about 7 miles, from the river of that name, and has on it a sand island, 30 feet long, and 2 feet high, which is not seen until close to. There is good anchorage on the southwest side, in 7 to 9 fathoms, coarse sand, at about 400 yards, from the edge of the reef. In 1882 this reef was plainly marked, by a schooner stranded near its center, both masts standing.

En Medio reef lies about 4 miles, NW. ¼ N., from the Tuspan reef, and E. ½ N., 5 miles, from the river Tanguijo; it is much smaller than the Tuspan reef, but affords anchorage, off the southwest end, in 5½, 7, or 9 fathoms.

Tanguijo reef lies about 2 miles farther to the northwest, and presents, on its southwest side, better shelter than at either of the banks just mentioned. This reef is about ¾ of a mile long, and is nearly divided into two parts by a deep bight in its western side; there are 3 and 4 fathoms close to it, except at the SE. point, off which shoal water extends 200 yards. The best anchorage is 200 yards off the mouth of the bight, in 6 fathoms.

The channels formed between these shoals are clear, with good depths, and between them and the coast there are no hidden dangers.

Cerro de San Juan, situated about 15 miles inland, is a remarkable, irregular ridge of high land, about 8 miles in extent, north and south; it bears NW. by W. from the entrance of the river Tuspan, WNW. from the bar of Tanguijo, and SW. ¼ S. from cape Roxo.

Coast.—From the bar of Tanguijo the shore trends N. by W. ½ W., about 11 miles, and then about N. by E. ½ E., for 19 miles, to cape Roxo.

Lobos island lies SE. ¼ S., about 9 miles, from cape Roxo. This island, about ¾ of a mile in diameter, is composed of sand, heaped up a few feet on a coral reef, and covered with bushes and trees, which grow to the height of about 30 feet above the sea. A heavy surf breaks upon all parts, and the beach being fringed with coral, renders landing always very difficult. From the west side of the island the reef extends about 200 yards; to the northward it stretches off about 2 miles; to the eastward about ¾ of a mile, and terminates with the south end of the island bearing WSW. ¾ W. Good water may be obtained on this island, by digging wells in the sand to the depth of 4 or 6 feet.

Anchorage, well sheltered from Northers, will be found in 7 or 8 fathoms, on sandy bottom, with the island bearing NNE. or N. by E., about 600 yards distant. With the island bearing N. the ground is sandy with stones, but to the eastward the ground is very foul.

Directions.—The edge of the eastern reef, which trends about S. by E. and N. by W., shows so distinctly that its south end may be rounded by the eye. There are 7 fathoms at about 200 yards from the reef, and it is advisable not to shoal to less than that depth, as a rocky ledge extends in a S. by E. direction from the island. In the event of being driven from the anchorage with a southerly wind, a vessel may run between Lobos island and Medio reef, about 3 miles northwest of the latter, and skirting the former at a safe distance.

Medio reef, on which the sea breaks, is about 200 yards in diameter, with 7 fathoms water close to.

Blanquilla reef, situated about 2 miles NW. of Medio reef, and SE., 3 miles, from cape Roxo, is about ½ mile in diameter, with a dry sand-bank in its center; this reef is steep-to, and breaks heavily.

The soundings in the channel between Blanquilla reef and the reef off cape Roxo, are very irregular, with 5 to 9 fathoms. It is doubtful if this passage is safe.

Cape Roxo is composed of low sand-hills, which, from about ½ mile northward of the cape, appear covered with trees and bushes, and extend along the coast to the southward. A reef extends from the cape 1½ miles.

The coast, from cape Roxo, trends NW. by N., 48 miles, to the entrance of Tampico river, and from the bar of Tanguijo to the latter it forms only a very narrow ridge of land, separating the Tamiagua lagoon from the sea. Between cape Roxo and the Tampico river entrance there are no known dangers, but the surf is so heavy that landing is attended by considerable risk. From cape Roxo northwest, for a distance of about 6 miles, the coast is very low and partly covered with bushes. From thence the land rises, and reaches, at its highest part, an elevation of about 70 feet, but it falls again as it approaches the bar of Tampico, where it is lower than at any other part of the coast. About 5 miles SW. of the Tampico bar there is a large umbrella-shaped tree, which is a conspicuous object on this part of the coast; and about 6 miles, SW. by S., from the bar, is the town of Tampico Alto, containing a cathedral.

The river Tampico takes its rise in the lake of Zumpango, on the table land of Tenochtitlan, and separates the provinces of Vera Cruz and Tamaulipas; its whole course, including its windings, being estimated at not less than 400 miles. It is navigable for vessels of 9½ feet draught to Panuco, a considerable town on the right bank, about 80

miles from the mouth, but only 40 by land; and for large canoes to San Juan, about 87 miles higher up.

On the left bank, 5 miles from the entrance, is Tampico, the capital of the province, which, lying in a hollow, is hid from the sea until within a very short distance of the coast.

The entrance of the river, generally known as La Barra, is about 600 yards wide, having across it a most dangerous bar of shifting sand, leaving a channel about 200 yards in width, carrying from 14, to as little as 8 feet water in the rainy season. It breaks heavily at all times, and is subject to almost daily variation in depth and direction; it is, therefore, in general, only accessible to vessels drawing about 9½ feet, and a pilot is indispensable.

The entrance of Tampico river may be distinguished by the objects on the north point, which consist of the signal staff, semaphore, and light tower, together with several huts that lie around. Two trees on a mound, about 3 miles SW. of the mouth of the river, form permanent landmarks, and are visible from a distance of 20 miles.

Signals.—The condition of the bar is telegraphed to the city by the electric telegraph and the semaphore, the signals made on the latter not being publicly known.

Light.—From a tower of iron frame-work, on the north shore of Tampico river entrance, is exhibited a *flashing white* light, elevated 141 feet above the sea, and visible in clear weather from a distance of 18 miles.

Anchorage.—Temporary anchorage may be obtained off Tampico bar, with the light-house about SW. by W., distant about 3 miles, in 6 to 8 fathoms, soft mud. The holding ground is excellent, but in the winter season a vessel that cannot cross the bar must leave, the moment the weather indicates the approach of a Norther.

Supplies.—Salt provisions are scarce and very high; in the market, beef, and sometimes mutton and pork, can be procured, but all of an indifferent quality; venison, and, in winter, game, such as ducks, &c., are plentiful; also oysters of poor quality, which are taken from the lagoon.

Coal and wood.—There is a small amount of coal, for the use of the railroad, which costs from $16 to $20 per ton. Wood is plentiful.

Water.—There is a well of tolerably good water near the custom store-house, and water of fair quality can be obtained from the lagoons.

Directions for Tampico.—The surest guide to the bar is, of course, a correct knowledge of the latitude, and no pains should be spared, night or day, to obtain it; for, as explained already, the currents on this coast are strong and variable according to the seasons, although running always north or south. The northernmost of the two trees previously mentioned, bearing about SW., will lead to the entrance of Tampico river.

The edge of soundings, on the parallel of the river, is about 12 or 15 miles distant, whence the depths gradually decrease to 6 fathoms at about 3 miles from the shore; and the bottom all the way in is soft, blue mud, without any sand; northward of the bar the depths are 7 and 8 fathoms, at about 3 miles from the beach, over a sandy bottom mixed with mud; but southward of it the shore is so bold that there are 22 to 24 fathoms, over a fine sandy bottom, at about the same distance. The only exception is off the sandy isthmus 4 miles N. of cape Roxo, where, for a small space, the sand is mixed with mud.

In the rainy season, when the current is generally running strong to the northward, it will be better to sight the land in the neighborhood of the wooded ridge N. of cape Roxo, where Monte San Juan will verify the position, should the weather be favorable, which, however, is extremely uncertain.

In the winter months, when the current may run to the southward after Northers, at the rate of 2 knots, it will be more advantageous to approach well to the northward, where the high land of Mecate may serve as a guide, not having a knowledge of the exact latitude.

In the event of being driven from the anchorage by the appearance of a Norther, instead of beating about, wear and tear will be saved by seeking shelter under Lobos island, which is 60 miles distant.

Tides.—The time of high water greatly depends on the weather and state of the river. The rise does not exceed 2 feet.

The coast, from the bar of Tampico, trends about N. by W. ¼ W., 17 miles, and then N. by E. ½ E., 7 miles, to the bar of the river Ciega; and for several miles it is composed of low, whitish sand-hills, partially covered with bushes. About 10 miles to the northward of Tampico bar the land rises a little, into a long ridge, covered with trees, which has a hollow in the middle, and to the northward of this it again becomes very low and sandy. At about 5 miles farther on, in the same direction, and 10 miles inland, is a remarkable, round, flat-topped hill, called Mecate, which, at a long distance, makes like an island.

The bar of Ciega has only 3 feet water, and is found by bringing the hill of Mecate to bear W. The Ciega drains an extensive shallow lagoon, which communicates with that of Altamira, and thence with the Panuco, near Tamaulipas; this lagoon is backed by a ridge of hills, about 200 feet high, covered with trees.

From the bar of Ciega the shore takes a NNE. direction, for about 8 miles, to an opening named Trinidad, which has no more than 2 feet at low water. Off this space the bottom is rocky. From the bar of Trinidad the coast runs NNE., 9 miles, to Zerez point; it is all the way low and sandy, and foul to a short distance off. From Zerez point the coast runs N. ¼ W., for 9 miles, to the bar of the river Tordo. The Tordo opening has less than 3 feet at low water; and within it are several shallow lagoons. The bottom in this space is clear, with the ex-

ception of some pointed rocks here and there, but none of them lying more than 2 miles from the shore. All this part of the coast is composed of low hillocks of sand.

The coast from Tordo bar runs N. ½ W. for 23 miles, to the Rio Indio Morales, an outlet of the Morales lagoon. In the rainy season the rise of water in Morales lagoon clears an opening at Ostional, a point 3 miles south of the Rio Indio Morales, near which is a watering place. This part of the coast is bordered by wooded hummocks, about 70 feet high, and is clear and bold. The Morales lagoon runs close along the back of the shore, as far as the Santander, a distance of 20 miles, and abounds in fish. This part of the coast presents a low sandy beach; and nowhere is good drinking water to be found, except at some distance inland.

The bar of Santander, or Soto de la Marina, has 6½ feet water, but is extremely dangerous, except after very fine weather; the hills named Palma and Corrizo are a guide for it, the channel lying between them.

This opening drains the Morales lagoon, just within it, which, although full of shoals, has a channel carrying 10 to 13 feet to the entrance of the Soto de la Marina, which has a depth of 4 or 5 fathoms. About 25 miles up this river is the town of Soto de la Marina, which is 30 miles from the colony of New Santander, where all necessary provisions can be procured.

Anchorage.—There is anchorage in 7 fathoms, about 2 miles from the bar of Santander, or in 10 fathoms, at the distance of 4 miles; but it is by no means safe in Northers, for the sea breaks as over a reef, even in the latter position.

Coast.—From the bar of Santander the shore trends northerly, 8 miles, to the southern entrance of Laguna de la Madre; then N. by. E., 66 miles to the Boquillas Cerradas. All this part of the coast is a narrow strip of land, from 1 to 5 miles in width, formed of low sand-hills, which separates Laguna de la Madre from the sea. The high lands of the interior terminate about 24 miles to the northward of the Santander, and thence all the land is very low, the water in the lagoons in many parts bounding the horizon. The shore is everywhere clear within a short distance of the beach, where there are generally 5 to 7 fathoms of water, hard bottom, except a small bank of 2½ fathoms, about 3 miles in length, lying 2 miles from the coast, and 26 miles north of the Rio Santander. In this space of 66 miles there are two passes into the lagoon, but with very little water in them; the southernmost one is marked by some huts near it.

The Boquillas Cerradas are four almost closed mouths, within the space of 5 miles, and are visible 10 miles off. After heavy gales they communicate with the Madre lagoon, which lies close behind the shore, and extends from the Santander to the river San Fernando or Tigre, which is the principal drain of the interior lagoons, discharging over a

bar of nearly 3 feet at low water, about 22 miles NNE. ½ E. from the northern Cerrada.

The coast, from the Boquillas Cerradas to the river San Fernando, is formed of low sand-hills, about 30 feet high, and is clear and bold.

Water.—From the communication it has with the lagoons, the water in the river San Fernando is brackish, but after heavy rains it is fresh. On the south coast of the bay formed by it, there is also a pool where good water may be obtained in a case of urgent need.

The coast, from the San Fernando, trends in a NE. by N. direction, for 9 miles, NNE., 17 miles, and N. ½ E., about 10 miles, to the entrance of the Rio Grande del Norte. From the entrance of the San Fernando river northward, for a distance of 25 miles, shelter from Northers is said to have been had by lying close under the land. A vessel so placed would be subject to the heavy rollers from the Gulf, but might find shelter from the heavy seas. This part of the coast is all along formed of sand hills, from 15 to 20 feet high, and is clear, except at 5 miles north of the river San Fernando, where there is a bank of 1¾ to 4¾ fathoms, 3½ miles in length, parallel with the coast, and 1 mile off. The only remarkable object is an opening 5 miles to the southward of the Rio Grande del Norte, which communicates with an extensive lagoon that runs along at the back of the coast. A bar runs across it, and extends about 3 miles, and the discolored fresh water from the lake reaches to a considerable distance beyond it.

General remarks.—All the coast which has been described to the northward of Tampico is moderately clear, with depths of from 3 to 7 fathoms, at 1 to 3 miles distance. The quality of the bottom is generally of sand, and, in some places, mud; on the bars of the rivers there is always very fine sand, which, on some, is mixed with soft mud.

The greater part of the lagoons have not more than 3 or 4 feet water at their greatest depth, and some parts of them are quite dry, except in the rainy season.

From August to April, so heavy a swell rolls in upon the shore, and the ESE. wind blows with such violence for 2 or 3 days previously to a Norther, as to render it quite impossible for a vessel to ride at her anchors in safety. In the other months, from April to August, the navigation is easy and secure, and assisted by the northerly and northeast current. The east winds, which blow from April to June, send in much sea; but anchorage may be obtained in 7 or 8 fathoms, in sight of the coast; still it will be more prudent to remain under sail.

The land breezes are frequent in the summer, from midnight until 9 or 10 a. m., when they yield to the sea breeze; but this change only takes place as far north as lat. 26° 30′ N., where the mountain range terminates; all the other parts to the northward are very flat, low and swampy, and on them there is but little rain; and this being the chief agent in producing the land winds, they are consequently not regular here.

The Rio Grande del Norte, which forms the boundary between the United States and Mexico, takes its rise in the State of Colorado, and its length, following the general direction of its course, is about 1,400 miles; but, owing to its sinuosity, the actual length of its bed is much greater. On the lower Rio Grande, the distance between any two points on its banks, following the bed of the river, compared with the distance in a direct line, is about as three to one. For four months in the year, that is from the middle of May until the middle of September, the river is subject to floods, and at least once during that time the banks are overflowed. Sometimes, though rarely, a rise occurs in October.

Bar.—The Rio Grande flows over a bar of shifting sand, on which there is an average depth of 3½ to 4 feet. This bar is very dangerous for strangers to approach, as it breaks almost continuously, and the channel is undergoing constant changes.

The river may be divided into four sections, or navigable divisions, commencing at its mouth, and ending at Roma.

Section I, from the mouth to Brownsville, is very crooked, and during the flood season there is a current of not less than 8 knots, for the first 20 miles. This section has an average depth of 3½ feet at low water, is unobstructed by rocks, and comparatively free from snags; but owing to the shifting sand, the channel frequently changes. The length of this section of the river is about 70 miles, while the distance by land is but 20 miles.

Section II, from Brownsville to Edinburgh, or Hidalgo, is also very tortuous. It is free from rocks, but obstructed by clay banks, or flats, which are dangerous at a medium stage of water, while at a low stage there are good channels around them. There are more snags in this section than in the one below, especially in the upper half. The average depth of water on the bars, in this section, is 2½ feet at low water. The distance from Brownsville to Hidalgo, by land, is about 55 miles, while the distance by river exceeds 150 miles.

Section III, from Hidalgo to Rio Grande City, has an average depth of 2 feet on the bar, at low stage of water, and rocks, clay benches, and snags abound; the reaches are longer and wider than in Section II, and there is, consequently, less water on the bars. The distance from Hidalgo to Rio Grande City, by land, is 45 miles, and by river about 125 miles.

Section IV, from Rio Grande City to Roma, has a rocky bed and abounds in snags; at a low stage of water this section is not navigable. Distance by land 15 miles, and by river 30 miles.

Four miles above Rio Grande City, the River San Juan empties into the Rio Grande del Norte, from the southward, and is navigable to the Mexican town of Camargo, a distance of 5 miles.

The principal products of the valley are corn, cotton, sugar, Mexican

beans, and hay. Live stock is raised extensively on both sides of the river. Trade on the river is carried on by light-draught steamers.

Brownsville, on the American side, contains a population of about 5,000, and the Mexican town of Matamoros, with a population of about 12,000, lies immediately opposite. Maritime trade with these places is carried on via Brazos Santiago, there being railway communication between this port and Brownsville. The principal exports are live stock, hides, hair, wool, lead, and silver coin.

The Mexican village of Bagdad lies near the south entrance point of the river.

Lights.—The entrance of the Rio Grande del Norte is within the range of visibility of two lights, about 8 miles to the northward. The light at Brazos Santiago is *fixed*, visible 13 miles; and the one at Point Isabel, 2½ miles to the westward of the first, *fixed* and *flash*, visible 15 miles.

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